AN ATLAS OF CONTAMINANTS IN EGGS OF FISH-EATING COLONIAL BIRDS OF THE GREAT LAKES (1970-1988)

VOLUME I
ACCOUNTS BY SPECIES AND LOCATIONS

Christine A. Bishop
D.V. (Chip) Weseloh
Neil M. Burgess
John Struger
Ross J. Norstrom
Richard Turle
Karen A. Logan

Technical report series (Canadian Wildlife Se
rvice)
No. 152 Date: 1992

SK 471 T42
OOFF

TECHNICAL REPORT SERIES No.152
Ontario Region 1992
Canadian Wildlife Service

CANADA'S GREEN PLAN

Environment Canada
Canadian Wildlife Service

Environnement Canada
Service canadien de la faune

Think recycling!
Printed on recycled paper

Canada

TECHNICAL REPORT SERIES
CANADIAN WILDLIFE SERVICE

This series of reports, established in 1986, contains technical and scientific information from projects of the Canadian Wildlife Service. The reports are intended to make available material that either is of interest to a limited audience or is too extensive to be accommodated in scientific journals or in existing CWS series.

Demand for these Technical Reports is usually confined to specialists in the fields concerned. Consequently, they are produced regionally and in small quantities; they can be obtained only from the address given on the back of the title page. However, they are numbered nationally. The recommended citation appears on the title page.

Technical Reports are available in CWS libraries and are listed with the DOBIS system in major scientific libraries across Canada. They are printed in the official language chosen by the author to meet the language preference of the likely audience. **To determine whether there is significant demand for making the reports available in the second official language, CWS invites users to specify their official language preference. Requests for Technical Reports in the second official language should be sent to the address on the back of the title page.**

SÉRIE DE RAPPORTS TECHNIQUES
DU SERVICE CANADIEN DE LA FAUNE

Cette série de rapports donnant des informations scientifiques et techniques sur les projets du Service canadien de la faune (SCF) a démarré en 1986. L'objet de ces rapports est de promouvoir la diffusion d'études s'adressant à un public restreint ou trop volumineuses pour paraître dans une revue scientifique ou l'une des séries du SCF.

Ordinairement, seuls les spécialistes des sujets traités demandent ces rapports techniques. Ces documents ne sont donc produits qu'à l'échelon régional et en quantités limitées; ils ne peuvent être obtenus qu'à l'adresse figurant au dos de la page titre. Cependant, leur numérotage est effectué à l'échelle nationale. La citation recommandée apparaît à la page titre.

Ces rapports se trouvent dans les bibliothèques du SCF et figurent aussi dans les listes du système de référence DOBIS utilisé dans les principales bibliothèques scientifiques du Canada. Ils sont publiés dans la langue officielle choisie par l'auteur en fonction du public visé. **En vue de déterminer si la demande est suffisamment importante pour produire ces rapports dans la deuxième langue officielle, le SCF invite les usagers à lui indiquer leur langue officielle préférée. Il faut envoyer les demandes de rapports techniques dans la deuxième langue officielle à l'adresse indiquée au verso de la page titre.**

Cover illustration is by R.W. Butler and may not be used for any other purpose without the artist's written permission.

L'illustration de la couverture est une œuvre de R.W. Butler. Elle ne peut dans aucun cas être utilisée sans avoir obtenu préalablement la permission écrite de l'auteur.

AN ATLAS OF CONTAMINANTS IN EGGS OF FISH-EATING COLONIAL BIRDS OF THE GREAT LAKES (1970-1988)

VOLUME I

ACCOUNTS BY LOCATIONS AND SPECIES

Technical Report Series No. 152

HERRING GULL NEST

Christine A. Bishop[1], D.V. (Chip) Weseloh[1], Neil M. Burgess[2], John Struger[3], Ross J.Norstrom[4], Richard Turle[5], Karen A. Logan[6]

[1]Canadian Wildlife Service, Box 5050, Burlington, Ontario, L7R 4A6
[2]Canadian Wildlife Service, Box 1590, Sackville, New Brunswick, E0A 3C0
[3]Inland Waters Directorate, Box 5050, Burlington, Ontario, L7R 4A6
[4]Canadian Wildlife Service, National Wildlife Research Centre, Hull, Quebec, K1A 0H3
[5]River Road Environmental Technology Centre, Environment Canada, Ottawa, Ontario, K1A 0H3
[6]Presentations Design, 5 Knots Landing, Stoney Creek, Ontario, L8E 4H2

This report may be cited as: Bishop, C.A., D.V. Weseloh, N.M. Burgess, J. Struger, R.J. Norstrom, R.Turle, K.A. Logan. 1992. An atlas of contaminants in eggs of fish-eating colonial birds of the Great Lakes (1970-1988) Vol. I. Technical Report Series No. 152, Canadian Wildlife Service, Ontario Region.

93-01723/

Published by Authority of the
Minister of Environment
Canadian Wildlife Service

© Minister of Supply and Services Canada 1992
Catalogue No. CW 69-5/152E
ISBN No. 0-662-19622-8
ISSN 0831-6481

Copies may be obtained from:
Canadian Wildlife Service
867 Lakeshore Road
Box 5050
Burlington Ontario L7R 4A6
Canada

RÉSUMÉ

Les Grands Lacs canadiens et américains ont été un lieu important de recherches et d'études sur la pollution et ses effets. Il existe aujourd'hui une somme énorme de données sur les niveaux de pollution dans les eaux, les sédiments et de nombreux niveaux trophiques des Grands Lacs. Toutefois, les scientifiques et le public éprouvent souvent de la difficulté à obtenir un résumé complet des données concernant la contamination à un ou plusieurs niveaux trophiques. Dans cet atlas, sont résumés les concentrations moyennes de trente-neuf contaminants ainsi que les pourcentages de lipides mesurés par le Service canadien de la faune, de 1970 à 1988, dans les oeufs de sept espèces d'oiseaux coloniaux piscivores de toutes les parties des Grands Lacs. L'atlas, qui contient 4 491 données, ne recense pas les données qui ont été recueillies par d'autres organismes.

Au début des années 70, une diminution des populations de plusieurs espèces d'oiseaux nicheurs piscivores a été constatée dans une grande partie des Grands Lacs (Gilbertson, 1975; Vermeer et Peakall, 1977 a et b; Postupalsky, 1978; Price et Weseloh, 1986; Weseloh et al., 1986). Dans le cas des espèces comme le Cormoran à aigrettes (Phalacrocorax auritus) dont les effectifs étaient relativement faibles par rapport aux goélands, la diminution était très évidente. Devant la baisse de productivité ou des effectifs de ces oiseaux, le Service canadien de la faune entreprit une étude sur les concentrations de contaminants dans les populations d'oiseaux piscivores des Grands Lacs et sur leurs effets biologiques possibles. Ces oiseaux, particulièrement les populations du lac Ontario, étaient parmi les plus fortement contaminés au Canada et au monde par diverses substances chimiques (Vermeer et Peakall, 1977).

Durant la deuxième moitié des années 70, suite à l'adoption de mesures restreignant l'utilisation et l'élimination de nombreux produits chimiques toxiques, les concentrations des contaminants ont commencé à baisser dans les oeufs d'oiseaux piscivores (Gilman et al., 1977; Weseloh et al., 1979). La plupart des populations de ces oiseaux ont conséquemment montré des signes de rétablissement (Price et Weseloh, 1986; Cadman et al., 1987).

Cet atlas réunit les données sur les concentrations de contaminants qui ont été mesurées dans les oeufs des oiseaux piscivores de 1970 à 1988. Il permet de localiser les données se rapportant à des lieux précis d'échantillonnage ou à des contaminants particuliers en procédant par étapes. Il est destiné à fournir rapidement et facilement réponse à diverses questions concernant, par exemple, les endroits où des oeufs ont été prélevés pour analyse, les données disponibles sur les concentrations de contaminants particuliers dans les oeufs d'oiseaux aquatiques coloniaux, les tendances spatiales et géographiques des concentrations des contaminants dans ces oeufs et l'alimentation de ces oiseaux dans la région des Grands Lacs.

Dans le volume I, l'information sur les concentrations des contaminants est résumée de trois façons différentes. Premièrement, l'information est présentée selon le lieu d'échantillonnage. Deuxièmement, les tendances des concentrations de quatre contaminants importants (p,p'-DDE, dieldrine, biphényles polychlorés et 2,3,7,8-tétrachlorodibenzo-p-dioxine) dans les oeufs du Goéland argenté sont présentées sous une forme graphique. Troisièmement, les tendances des populations de chaque espèce ainsi que les tendances géographiques et temporelles des concentrations des contaminants dans les oeufs de chacune sont montrées. Afin de faciliter l'interprétation des données sur les contaminants, on a également inclus dans ce volume un résumé des aliments qu'utilisent les oiseaux de chaque espèce dans la région des Grands Lacs.

Dans le volume II, les données sont résumées uniquement suivant le type de contaminant mesuré dans les oeufs.

ACKNOWLEDGEMENTS

We would like to acknowledge the following people who have enthusiastically, and diligently contributed to the study of contaminants in colonial waterbird eggs during 1970-1988. Michael Gilbertson, Andrew Gilman, Glen Fox, Pierre Mineau, Stanley Teeple, Douglas Hallett, Earl Walker, Martin McNicholl, Hans Blokpoel, Gaston Tessier, Ralph Morris, Jim Brown, Earl Walker, Larry Benner, Jim Brown, Jim Ludwig, Greg Smith, Lauri Maus, Ann Harfenist, Sergei Postupalsky, Gary Shugart, Tim Kubiak, Ken Stromberg, John Ryder, Tim Carroll, Rob Dobos, Vicky Johnston, Jeanette Bider, Rhonda Markel, John Chardine, Robert Hoffman, Denis Case, Jeff Robinson, Peter Ross, Peter Ewins, Margie Koster, Karen Pettit, and Brian McHattie collected eggs or assisted with this project.

Access to nesting colonies was graciously provided by: Jim Day, Phillips Petroleum Company, Presquile Provincial Park, Metropolitan Toronto Parks and Recreation, Metro Toronto Region Conservation Authority, Hamilton Harbour Commission, Ontario Hydro, Niagara Parks Commission, Dept. of Transport, Canadian Wildlife Service, Long Point Company, Canada Furnace Company, Cruse Moss, Ontario Ministry of Natural Resources, BASF Corporation, Walpole Island Native Band, and the U.S. Army Corps of Engineers.

Useful comments on draft manuscript(s) of the atlas were provided by W. Keith Marshall, John Elliott, and Glen Fox. Alvaro Jaramillo and Rod McCaw assisted in the proof-reading of the entire data set of the atlas.

We also acknowledge support from the Great Lakes Action Plan. The project would not have been completed without funding from the Preservation Program. In addition, Environment Canada's Great Lakes Cleanup Fund provided funds to print this report.

Many people have contributed to this work over the past eighteen years. We hope we have not forgotten anyone, but undoubtedly some volunteer(s) who came out for a day or a few hours to help may have been omitted. Our apologies. Here's to flat water forever!

TABLE OF CONTENTS

Page

Résumé.. i

List of Tables.. vii

List of Figures... ix

Introduction.. 12

Instructions for users of this Atlas............................ 13

Compounds analyzed in eggs of selected fish-eating birds of the Great Lakes (1970-1988)........................... 16

List of Abbreviations Specific to Tables 1-10................... 17

Great Lakes annual monitor colonies (Fig. 1-10)
- St.Lawrence River.. 18
- Eastern Lake Ontario....................................... 20
- Western Lake Ontario and Niagara River..................... 22
- Eastern Lake Erie.. 24
- Western Lake Erie, Detroit River and Lake St.Clair......... 26
- Lake Huron... 28
- Georgian Bay... 30
- North Channel, Lake Huron.................................. 32
- Lake Michigan.. 34
- Lake Superior.. 36

Summary of species sampled, compounds analyzed and number of eggs analyzed in each sample year (1970-1988) from Great Lakes annual monitor colonies (Tables 1-10)
- St.Lawrence River.. 19
- Eastern Lake Ontario....................................... 21
- Western Lake Ontario and Niagara River..................... 23
- Eastern Lake Erie.. 25
- Western Lake Erie, Detroit River and Lake St.Clair......... 27
- Lake Huron... 29
- Georgian Bay... 31
- North Channel, Lake Huron.................................. 33
- Lake Michigan.. 35
- Lake Superior.. 37

Methodological and Statistical Notes specific to Table 11 38

Section 1.
Index to Contaminant Data, summarized by Location............... 1-2
Contaminant Data, summarized by Location (Table 11)............. 1-8

Section 2.

Index to Trends in Contaminants in Herring Gull eggs from Great Lake monitor colonies........................ 2-2
Eastern Lake Ontario-Snake Island/West Brothers Island... 2-3
Eastern Lake Ontario-Scotch Bonnet Island................ 2-4
Western Lake Ontario-Mugg's Island/Leslie St. Spit....... 2-5
Niagara River.. 2-6
Eastern Lake Erie-Port Colborne Lighthouse............... 2-7
Western Lake Erie-Middle Island.......................... 2-8
Detroit River-Fighting Island............................ 2-9
Lake Huron-Chantry Island................................ 2-10
Lake Huron-Double Island................................. 2-11
Lake Huron-Channel Shelter Island........................ 2-12
Lake Michigan-Gull Island/Trout Island................... 2-13
Lake Michigan
-Big Sister Island/Hat Island/
Little Sister Island...................................... 2-14
Lake Superior-Agawa Rock/Mammainse........................ 2-15
Lake Superior-Granite Island/Silver Islet................ 2-16

Section 3.

Index to and Introduction to Species Accounts................ 3-1
Herring Gull- Distribution, Abundance and Population Trends... 3-2
Years and sites of collections of Herring Gull eggs (Table 12)... 3-8
Contaminant trends examined.................................. 3-8
Temporal variation in contaminant concentrations............. 3-9
Geographic variation in contaminant concentrations........... 3-10
Summary/Discussion... 3-11

Double-Crested Cormorant- Distribution, Abundance and Population Trends.. 3-12
Years and sites of collections of Double-crested Cormorant eggs (Table 13)... 3-13
Contaminant trends examined.................................. 3-14
Temporal variation in contaminant concentrations............. 3-14
Geographic variation in contaminant concentrations........... 3-14
Summary/Discussion... 3-15

Caspian Tern- Distribution, Abundance and Population Trends... 3-16
Years and sites of collections of Caspian Tern eggs (Table 14)... 3-16
Contaminant trends examined.................................. 3-17
Temporal variation in contaminant concentrations............. 3-17
Geographic variation in contaminant concentrations........... 3-17
Summary/Discussion... 3-17

Common Tern- Distribution, Abundance and Population Trends... 3-18
Years and sites of collections of Common Tern eggs (Table 15)........ 3-19
Contaminant trends examined........ 3-19
Temporal variation in contaminant concentrations........ 3-19
Geographic variation in contaminant concentrations........ 3-20
Summary/Discussion........ 3-20

Black-crowned Night-Heron- Distribution, Abundance and Population Trends........ 3-21
Years and sites of collections of Black-crowned Night-Heron eggs(Table 16)........ 3-21
Contaminant trends examined........ 3-22
Temporal variation in contaminant concentrations........ 3-22
Geographic variation in contaminant concentrations........ 3-22
Summary/Discussion........ 3-23

Ring-billed Gull-Distribution, Abundance and Population Trends.3-24
Years and sites of collections of Ring-billed Gull eggs (Table 17)........ 3-24
Contaminant trends examined........ 3-24
Temporal variation in contaminant concentrations........ 3-24
Geographic variation in contaminant concentrations........ 3-25
Summary/Discussion........ 3-25

Forsters' Tern-Distribution, Abundance and Population Trends.. 3-26
Years and sites of collections of Forster's Tern eggs (Table 18)........ 3-26
Contaminant trends examined........ 3-26
Temporal variation in contaminant concentrations........ 3-26
Geographic variation in contaminant concentrations........ 3-26
Summary/Discussion........ 3-26

Section 4.

Index to diets of selected colonial fish-eating birds of the Great Lakes........ 4-2
Abbreviations specific to Table 19........ 4-3
List of Scientific Names specific to Table 19........ 4-4
Diets of selected colonial fish-eating birds of the Great Lakes (Table 19)........ 4-6
References........ 4-15

LIST OF TABLES

Page

Table 1. The sample size of eggs analyzed in each year (1970-1988) from the St. Lawrence River, arranged by collection site, species sampled and compound analyzed.. 19

Table 2. The sample size of eggs analyzed in each year (1970-1988) in Eastern Lake Ontario, arranged by collection site, species sampled and compound analyzed.. 21

Table 3. The sample size of eggs analyzed in each year (1970-1988) in Western Lake Ontario and the Niagara River, arranged by collection site, species sampled and compound analyzed.. 23

Table 4. The sample size of eggs analyzed in each year (1970-1988) in Eastern Lake Erie, arranged by collection site, species sampled and compound analyzed.. 25

Table 5. The sample size of eggs analyzed in each year (1970-1988) in Western Lake Erie, Lake St. Clair and the Detroit River, arranged by collection site, species sampled and compound analyzed.......................... 27

Table 6. The sample size of eggs analyzed each year (1970-1988) in Lake Huron, arranged by collection site, species sampled and compound analyzed................. 29

Table 7. The sample size of eggs analyzed each year (1970-1988) in Georgian Bay, arranged by collection site, species sampled and compound analyzed................. 31

Table 8. The sample size of eggs analyzed each year (1970-1988) in the North Channel of Lake Huron, arranged by collection site, species sampled and compound analyzed.. 33

Table 9. The sample size of eggs analyzed each year (1970-1988) in Lake Michigan, arranged by collection site, species sampled and compound analyzed................. 35

Table 10. The sample size of eggs analyzed each year (1970-1988) in Lake Superior, arranged by collection site, species sampled and compound analyzed................. 37

Table 11. Contaminant data, summarized by Location 1-8

Table 12. Collection sites and years of Herring Gull egg collection.. 3-8

Table 13. Collection sites and years of Double-crested Cormorant egg collection.................................... 3-13

Table 14. Collection sites and years of Caspian Tern egg collection.. 3-16

Table 15. Collection sites and years of Common Tern egg collection.. 3-19

Table 16. Collection sites and years of Black-crowned Night-Heron egg collection................................ 3-21

Table 17. Collection sites and years of Ring-billed Gull egg collection.. 3-24

Table 18. Collection sites and years of Forster's Tern egg collection.. 3-26

Table 19. Diets of selected colonial fish-eating birds of the Great Lakes.. 4-6

LIST OF FIGURES

Page

Figure 1. The St.Lawrence River colony of fish-eating birds from which eggs were collected for contaminant analysis.................................... 18

Figure 2. Eastern Lake Ontario colonies of fish-eating birds from which eggs were collected for contaminant analysis.................................... 20

Figure 3. Western Lake Ontario and Niagara River colonies of fish-eating birds from which eggs were collected for contaminant analysis.................... 22

Figure 4. Eastern Lake Erie colonies of fish-eating birds from which eggs were collected for contaminant analysis....................................... 24

Figure 5. Western Lake Erie, Lake St.Clair and Detroit River colonies of fish-eating birds from which eggs were collected for contaminant analysis....................................... 26

Figure 6. Lake Huron colonies of fish-eating birds from which eggs were collected for contaminant analysis....................................... 28

Figure 7. Georgian Bay colonies of fish-eating birds from which eggs were collected for contaminant analysis....................................... 30

Figure 8. North Channel, Lake Huron colonies of fish-eating birds from which eggs were collected for contaminant analysis........................ 32

Figure 9. Lake Michigan colonies of fish-eating birds from which eggs were collected for contaminant analysis....................................... 34

Figure 10. Lake Superior colonies of fish-eating birds from which eggs were collected for contaminant analysis....................................... 36

Figure 11. Trends in concentrations of p,p'-DDE, dieldrin, PCB 1254:1260 and 2,3,7,8-TCDD in Herring Gull eggs from Snake Island and West Brother Island, Lake Ontario (1974-1988)................... 2-3

Page

Figure 12. Trends in concentrations of p,p'-DDE, dieldrin, PCB 1254:1260 and 2,3,7,8-TCDD in Herring Gull eggs from Scotch Bonnet Island, Lake Ontario (1974-1988) 2-4

Figure 13. Trends in concentrations of p,p'-DDE, dieldrin, PCB 1254:1260 and 2,3,7,8-TCDD in Herring Gull eggs from Mugg's Island and Leslie St. Spit, Lake Ontario (1974-1988) 2-5

Figure 14. Trends in concentrations of p,p'-DDE, dieldrin, PCB 1254:1260 and 2,3,7,8-TCDD in Herring Gull eggs from the Niagara River (1979-1988) 2-6

Figure 15. Trends in concentrations of p,p'-DDE, dieldrin, PCB 1254:1260 and 2,3,7,8-TCDD in Herring Gull eggs from Port Colborne Lighthouse, Lake Erie (1974-1988) 2-7

Figure 16. Trends in concentrations of p,p'-DDE, dieldrin, PCB 1254:1260 and 2,3,7,8-TCDD in Herring Gull eggs from Middle Island, Lake Erie (1974-1988) 2-8

Figure 17. Trends in concentrations of p,p'-DDE, dieldrin, PCB 1254:1260 and 2,3,7,8-TCDD in Herring Gull eggs from Fighting Island, Detroit River (1972-1988) 2-9

Figure 18. Trends in concentrations of p,p'-DDE, dieldrin, PCB 1254:1260 and 2,3,7,8-TCDD in Herring Gull eggs from Chantry Island, Lake Huron (1980-1988) 2-10

Figure 19. Trends in concentrations of p,p'-DDE, dieldrin, PCB 1254:1260 and 2,3,7,8-TCDD in Herring Gull eggs from Channel Shelter Island, Lake Huron (1974-1988) 2-11

Figure 20. Trends in concentrations of p,p'-DDE, dieldrin, PCB 1254:1260 and 2,3,7,8-TCDD in Herring Gull eggs from Double Island, North Channel, Lake Huron (1980-1988) 2-12

Figure 21. Trends in concentrations of p,p'-DDE, dieldrin, PCB 1254:1260 and 2,3,7,8-TCDD in Herring Gull eggs from Gull Island, and Trout Island, Lake Michigan (1978-1988) 2-13

Page

Figure 22. Trends in concentrations of p,p'-DDE, dieldrin, PCB 1254:1260 and 2,3,7,8-TCDD in Herring Gull eggs from Big Sister Island and Little Sister Island, Lake Michigan (1971-1986) 2-14

Figure 23. Trends in concentrations of p,p'-DDE, dieldrin, PCB 1254:1260 and 2,3,7,8-TCDD in Herring Gull eggs from Agawa Rock and Mammainse Harbour, Lake Superior (1974-1988)................ 2-15

Figure 24. Trends in concentrations of p,p'-DDE, dieldrin, PCB 1254:1260 and 2,3,7,8-TCDD in Herring Gull eggs from Granite Island and Silver Islet, Lake Superior (1973-1988)................. 2-16

INTRODUCTION

The Great Lakes of Canada and the United States have been a major arena for research and monitoring studies of pollution levels and effects. Today, there is an enormous database on the pollution levels in water, sediment and many trophic levels of the Great Lakes. However, it is often difficult for scientists and the public to easily locate a comprehensive summary of data concerning contamination in any or all of these trophic levels. This atlas provides a summary of the mean concentrations of thirty-nine contaminants and the percent lipid measured in eggs of seven species of fish-eating colonial birds sampled only by the Canadian Wildlife Service throughout the Great Lakes during 1970-1988. There are 4491 data points presented in the atlas; however, this does not include any contaminant data concerning biota in the Great Lakes collected by other organizations and agencies.

Throughout much of the Great Lakes, the population levels of several species of breeding fish-eating birds declined during the early 1970s (Gilbertson, 1975; Vermeer and Peakall, 1977a,b; Postupalsky, 1978; Price and Weseloh, 1986; Weseloh et al., 1986). For species such as, the Double-crested Cormorant (Phalacrocorax auritus), whose numbers were low relative to gulls, population declines were extremely conspicuous. In response to lowered productivity and/or declining population levels, the Canadian Wildlife Service began a study of the contaminant levels in Great Lakes populations of fish-eating birds, and their possible biological effects. These species were among the most heavily contaminated by various toxic chemicals in Canada and the world, especially populations located in Lake Ontario (Vermeer and Peakall, 1977).

With the advent of legislative controls and restrictions on the use and disposal of many toxic chemicals, chemical concentrations found in eggs of fish-eating birds began to decline after the mid-1970s (Gilman et al.,1977; Weseloh et al., 1979). Accordingly, most of the fish-eating bird populations have shown signs of recovery (Price and Weseloh, 1986; Cadman et. al., 1987).

We present the levels of contaminants found in eggs of fish-eating birds throughout 1970-1988. Data from specific sampling locations or specific contaminants can be retrieved in a stepwise manner from this atlas. The purpose of the atlas is to provide a quick and easy answer to questions such as where have eggs been collected for analysis; how much data is available on levels of specific contaminants in eggs of colonial waterbirds; what are the spatial and geographic trends in contaminant levels in these bird eggs; and finally, what is the diet of colonial waterbirds in the Great Lakes?

In Volume I, information on contaminant levels is summarized in three different manners. Firstly, it is presented on the basis of sample locations. Secondly, trends in levels of four major contaminants: p,p'-DDE, dieldrin, polychlorinated biphenyls and 2,3,7,8-tetrachlorodibenzo-p-dioxin in Herring Gull eggs are presented in graphic form. Thirdly, population trends of each species, and geographic, and temporal trends in contaminant levels in the eggs of each species are given. Also in Volume I, a summary of the diets of each species in the Great Lakes is provided as an aid for interpretation of the contaminant data.

In Volume II, data is summarized only on the basis of the types of contaminants measured in eggs.

INSTRUCTIONS FOR USERS OF THIS ATLAS

The contaminant data contained in this Atlas (Volumes I and II) is presented in four forms:

1. Mean concentrations of contaminants, summarized by location (Volume I, Section 1).
2. Mean concentrations of contaminants, summarized by compound (Volume II, Section 1).
3. Trends in four contaminants in Herring Gull eggs from Great Lakes annual monitor colonies (Volume I, Section 2).
4. Discussion of population trends, and temporal and geographic variation in contaminant levels for seven species on the Great Lakes (Volume I, Section 3).

Also, the results of diet studies, primarily on the Great Lakes, for each species for which eggs have been collected for contaminant analysis are summarized (Volume I, Section 4).

This atlas has been designed to be used in a stepwise manner. The quickest method of finding the data available for a specific location or a specific chemical is described below.

1) This first step is designed to alert the user to the scope of the database in the document. Tables 1-10 are summaries of species sampled, compounds analyzed and number of eggs analyzed in each sample year (1970-1988) from colonies on the Great Lakes. The accompanying maps (Figures 1-10) illustrate the locations of Great Lakes colonies of fish-eating birds from which eggs were collected for contaminant analysis. The colony names are numbered on the maps and these correspond to the numbers on the accompanying tables. These tables are present in both Volume I and Volume II.

For example, if you are interested in types of contaminants and the levels found in the eggs of fish-eating birds in the Kingston area, you would refer to Figure 2 (p.20), which illustrates the colonies sampled in Eastern Lake Ontario. The colonies: Snake Island, West Brothers Island, Pigeon Island, and Little Galloo Island are located near Kingston. You would then refer to Table 2, which lists the species whose eggs were sampled at each of these colonies, the years of sampling and the contaminants measured in the eggs. This simply and quickly informs you how much data is available for species in every area of the Great Lakes.

2) The second step, is to locate the mean, standard deviation and sample size for each contaminant measurement in the eggs of every species that has been sampled in the location of interest. Volume I, Section 1 and Volume II, Section 1, contain summaries of the same data but present the data in two different ways. In Section 1, (Table 11), **Volume** I, the contaminant data is presented by sampling location and in Section 1 (Table 11) **Volume II**, the contaminant data is presented by types of chemicals measured in the eggs.

For example, if you are interested in data concerning species on Snake Island, refere to the data summary by sample location (Table 11, Volume I). If you are interested in data throughout the Great Lakes or in only a few colonies near Kingston concerning the chemical Dieldrin, then reference to the data summary by chemical analyzed in eggs (Table 11, Volume II), would be most suitable.

Data summary by Location Sampled (**Volume I, Section 1**).

An index lists the lakes and colonies sampled throughout the Great Lakes (p.1-2). It lists the page numbers in Table 11 on which all contaminant data can be found concerning each species at each colony.

Following the index, Table 11 presents contaminant data for eggs of fish-eating birds summarized by lakes, colonies and years sampled.

Data summary by Chemical Analyzed in Eggs (**Volume II, Section 1**).

An index lists the page numbers in Table 11 on which the data for each contaminant can be found for the colonies sampled in each lake.

Following the index, Table 11 presents contaminant data for eggs of fish-eating birds summarized by the chemical measured in the eggs for all lakes, colonies, species and years sampled.

For example, if you are interested in data concerning species on Snake Island he would refer to the data summary by location sampled (Table 11, Volume I). If you were interested in data throughout the Great Lakes or in only a few colonies for the chemical Dieldrin then reference to the data summary by chemical analyzed in eggs (Table 11, Volume II), would be most suitable.

It is important that the summary of methodologies and statistical notes pertaining to the contaminant data (p.38) is examined by all readers to facilitate proper interpretation of the data.

The locations, chemicals analyzed, and species are listed in the following order in all indices and tables:

1. The Lakes and colony locations are listed, generally, in east to west order.

2. The contaminants measured are listed, generally, in alphabetical order. A list of the order of the contaminants measured and the abbrevations used on the tables is supplied (p.16).

3. The species sampled are listed in the following order:
   - Herring Gull (Larus argentatus)
   - Double-crested Cormorant (Phalacrocorax auritus)
   - Caspian Tern (Sterna caspia)
   - Common Tern (Sterna hirundo)
   - Black-crowned Night Heron (Nycticorax nycticorax)
   - Ring-billed Gull (Larus delawarensis)
   - Forster's Tern (Sterna forsteri)

This list is arranged in sequential order which reflects the species for which we have the most (Herring Gull) to least data. Section 2 (Volume I). Additional graphic presentations of data are available in the Atlas in the form of:

Trends in contaminants (p,p'-dde, dieldrin, polychlorinated biphenyl 1254:1260, 2,3,7,8-tetrachlorodibenzo-p-dioxin) in Herring Gull eggs (Figures 11-24, Volume I). Histograms illustrate trends in these four contaminants in Herring Gull eggs from 1971 to 1988 for at least two colonies per lake.

Species Accounts (**Section 3, Volume I**).

These accounts discuss the population trends for each species, and the general spatial and temporal trends in major contaminant levels in the eggs of each species sampled during 1970-1988 (Tables 12-18, Volume I).

Diets of Selected Fish-eating Birds (**Section 4, Volume I**).

The results of diet studies, primarily on the Great Lakes, for each species for which eggs have been collected for contaminant analysis are summarized in tabular form (Table 19).

COMPOUNDS ANALYZED IN EGGS OF FISH-EATING BIRDS OF THE GREAT LAKES

The following compounds are listed in alphabetical order except for "percent lipid in egg". The underlined sections of the chemical names are the words which were used to place the chemical in its alphabetical position in the list. Chemical congeners are listed in order of increasing chlorination. The order of names in this list is consistently used throughout the tables in this document. Abbreviations correspond to those on Table 1 through Table 10.

CAS #	COMPOUNDS	ABBREVATION
	Percent lipid in egg	% Lip
7440-38-2	Arsenic	As
7440-43-9	Cadmium	Cd
5103-71-9	alpha(cis)-chlordane	a-chl
5103-74-2	gamma(trans)- chlordane	g-chl
7304-13-8	oxy-chlordane	o-chl
87-61-6	1,2,3-chlorobenzene	123-CB
120-82-1	1,2,4-chlorobenzene	124 CB
180-70-3	1,3,5-chlorobenzene	135-CB
634-66-2	1,2,3,4-chlorobenzene	1234-CB
	1,2,3,5-/1,2,4,5-chlorobenzene	1235/1245CB
608-93-5	penta-chlorobenzene	PeCB
118-74-1	hexachlorobenzene	HCB
72-54-8	DDD	DDD
72-55-9	DDE	DDE
50-29-3	DDT	DDT
60-57-1	Dieldrin	Diel
1746-01-6	2,3,7,8-tetrachlorodibenzo-p-dioxin	Dioxin
40321-76-4	1,2,3,7,8-pentachlorodibenzo-p-dioxin	Dioxin
39227-28-6	1,2,3,6,7,8-hexachlorodibenzo-p-dioxin	Dioxin
35822-46-9	1,2,3,4,6,7,8-heptachlorodibenzo-p-dioxin	Dioxin
3268-87-7	octachlorodibenzo-p-dioxin	Dioxin
51207-31-9	2,3,7,8-tetrachlorodibenzofuran	Furan
57117-31-4	2,3,4,7,8-pentachlorodibenzofuran	Furan
	1,2,3,4,7,8-/1,2,3,4,6,7-hexachlorodibenzofuran	Furan
55684-94-1	1,2,3,6,7,8-hexachlorodibenzofuran	Furan
1024-57-3	Heptachlor epoxide	Hep Epx
39-84-6	alpha-hexachlorocyclohexane	a-hch
39-85-7	beta-hexachlorocyclohexane	b-hch
58-89-8	gamma-hexachlorocyclohexane	g-hch
7439-92-1	Lead	Pb
7439-97-6	Total mercury	Hg
2385-85-5	Mirex	Mir
39801-14-4	photomirex	P Mir
5103-73-1	cis-nonachlor	c-non
39765-80-5	trans-nonachlor	t-non
	Octachlorostyrene	OCS
11097-69-1	PCB-1260	PCB 1260
11096-82-5	PCB-1254:1260	PCB 1254:1260
7782-49-2	Selenium	Se

LIST OF ABBREVIATIONS SPECIFIC TO Tables 1-10

Col no.	colony number
Spec.	species
yr	year of egg collection
HERG	Herring Gull
DCCO	Double-crested Cormorant
CATE	Caspian Tern
COTE	Common Tern
BCNH	Black-crowned Night-Heron
RBGU	Ring-billed Gull
FOTE	Forster's Tern

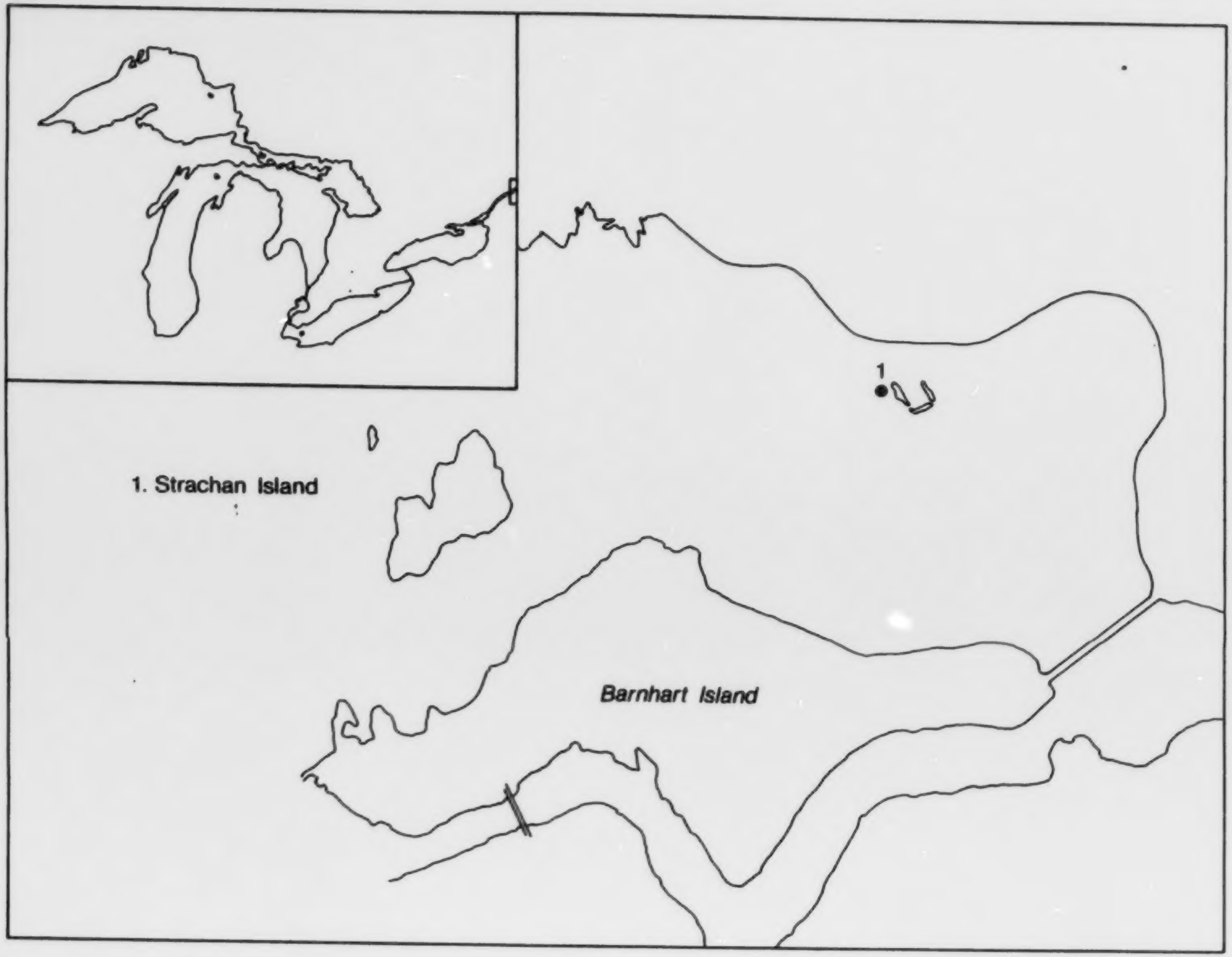

1
1. Strachan Island
Barnhart Island

Figure 1. St. Lawrence River colonies of fish-eating birds from which eggs were collected for contaminant analysis.

Table 1. The sample size of eggs analyzed in each year (1970–1988) from the St.Lawrence River, arranged by collection site, species sampled, and compound analyzed.

Col. No.	Spec	Yr	% Lip	As	Cd	a–chl	g–chl	o–chl	124 CB	123 CB	135 CB	1234 CB	1236/ 1245 CB	PeCB	HCB	DDD	DDE	DDT	DIEL	DIOXIN	FURAN	HEP EPX	a–hch	b–hch	g–hch	Pb	Hg	MIR	P–MIR	c–non	t–non	OCS	PCB 1260	PCB 1254: 1260	Se
1	HERG	86	1	0	0	1	0	1	0	0	0	0	0	0	1	1	1	1	1	1	1	1	0	1	0	0	0	1	1	1	1	0	1	1	0
		88	1	0	0	1	1	1	0	0	0	1	1	1	1	1	1	1	1	0	0	1	1	1	1	0	0	1	1	1	1	1	1	1	0

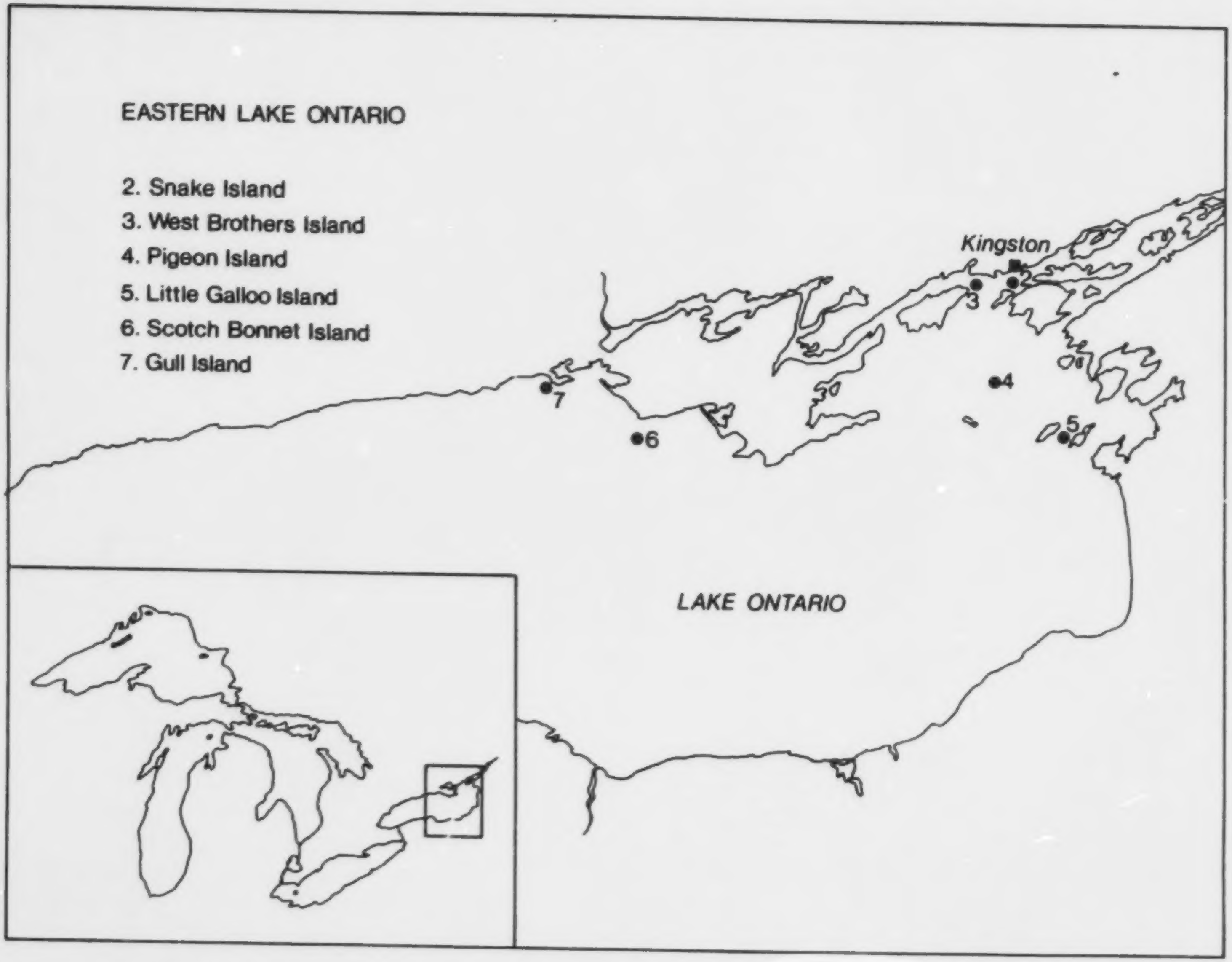
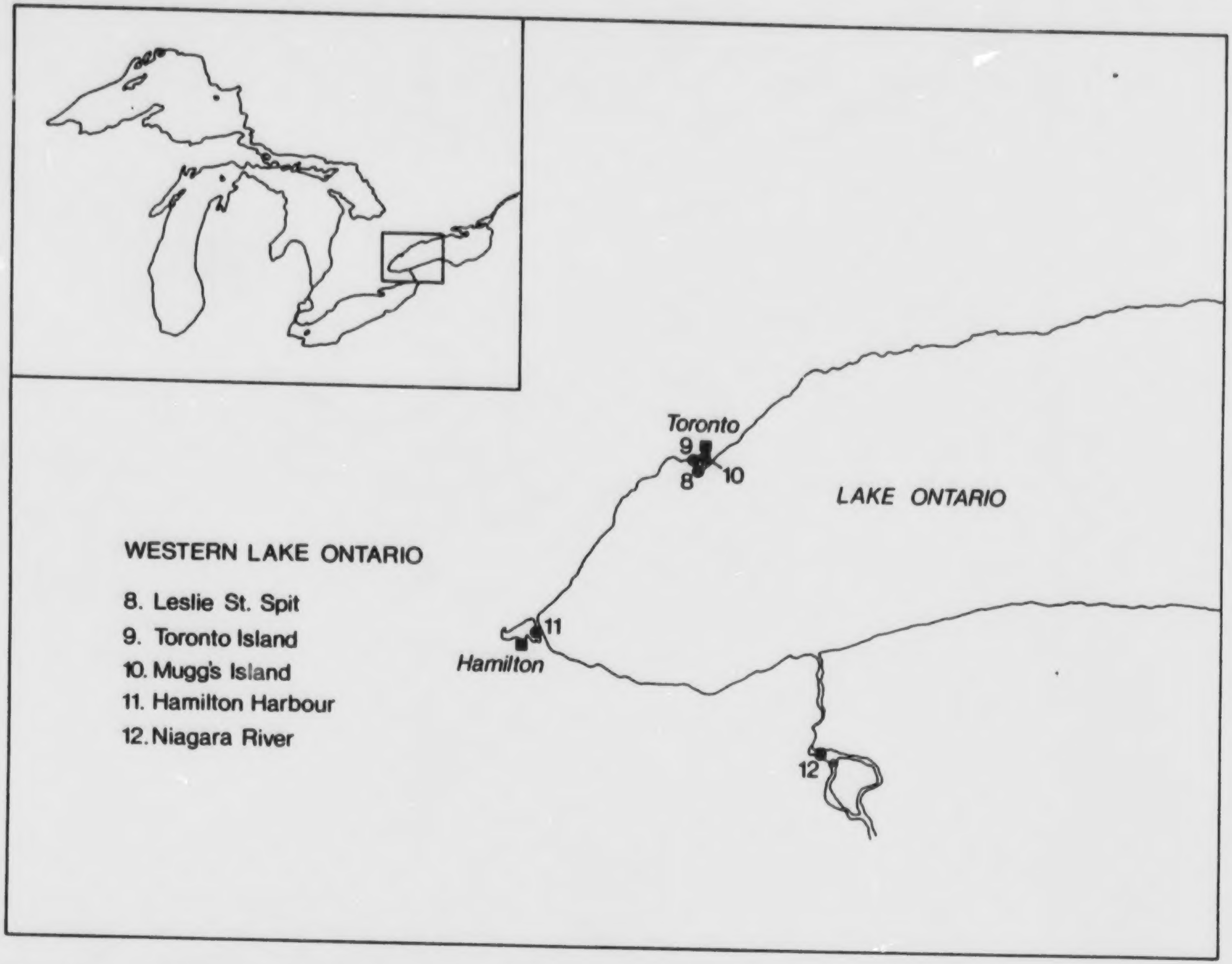

EASTERN LAKE ONTARIO
2. Snake Island
3. West Brothers Island
4. Pigeon Island
5. Little Galloo Island
6. Scotch Bonnet Island
7. Gull Island
Kingston
3
4
5
6
7
LAKE ONTARIO

Figure 2. Eastern Lake Ontario colonies of fish-eating birds from which eggs were collected for contaminant analysis.

Table 2. The sample size of eggs analyzed in each year (1970–1988) from Eastern Lake Ontario, arranged by collection site, species sampled and compound analyzed.

Col. No.	Spec	Yr	% Lip	As	Cd	a-chl	g-chl	o-chl	124 CB	123 CB	135 CB	1234 CB	1235/ 1245 CB	PeCB	HCB	DDD	DDE	DDT	DIEL	DIOXIN	FURAN	HEP EPX	a-hch	b-hch	g-hch	Pb	Hg	MIR	P-MIR	c-non	t-non	OCS	PCB 1260	PCB 1254: 1260	Se
2	HERG	77	10	10	10	10	0	10	0	0	0	0	0	0	10	10	10	10	10	0	0	10	0	10	0	10	0	10	10	0	0	0	10	10	10
		78	10	0	0	0	0	10	0	0	0	0	0	0	10	0	10	10	10	0	0	10	0	10	0	0	0	10	10	0	0	0	10	10	0
		79	10	0	0	10	0	10	10	10	10	10	10	10	10	10	10	10	10	0	0	10	0	10	0	0	0	10	10	0	0	0	10	10	0
		80	10	0	0	10	0	10	0	0	0	10	10	10	10	10	10	10	10	0	0	10	0	10	0	0	0	10	0	0	0	0	10	10	0
		81	10	0	0	10	0	10	0	0	0	10	10	10	10	10	10	10	10	1	0	10	0	10	0	0	10	10	0	0	0	0	10	10	0
		82	10	0	0	1	10	10	0	0	0	10	10	10	10	10	10	10	10	1	0	10	0	10	0	0	10	10	0	0	10	0	10	10	0
		83	11	0	0	11	11	11	0	0	0	11	11	11	11	11	11	11	11	1	0	11	11	11	0	0	11	9	0	0	11	0	11	11	0
		84	10	0	0	10	10	10	0	0	0	10	10	10	10	10	10	10	10	1	1	10	10	10	0	0	0	10	0	0	10	0	0	10	0
		85	10	0	0	10	10	10	0	0	0	10	10	10	10	10	10	10	10	1	1	10	10	10	0	0	10	10	0	10	10	0	10	10	0
		86	10	0	0	10	0	10	0	0	0	0	0	0	10	10	10	10	10	1	1	10	0	10	0	0	0	10	10	1	10	0	10	10	0
		87	1	0	0	1	1	1	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	1	1	1	1	1	1	1	0
		88	1	0	0	1	1	1	0	0	0	1	1	1	1	1	1	1	1	0	0	1	1	1	1	0	0	1	1	1	1	1	1	1	0
3	HERG	73	16	0	0	0	0	0	0	0	0	0	0	0	16	16	16	16	16	0	0	16	0	16	0	0	16	0	0	0	0	0	16	16	0
		74	10	0	0	10	10	0	0	0	0	0	0	0	10	10	10	10	10	0	0	10	0	0	0	0	10	10	0	0	0	0	10	10	0
		75	10	0	0	10	10	0	0	0	0	0	0	0	10	10	10	10	10	0	0	10	0	0	0	0	10	10	0	0	0	0	10	10	0
4	HERG	72	1	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	0	0	1	0	0	0	0	1	0	0	0	0	0	1	0	0
		81	10	0	0	10	2	10	0	0	0	10	10	10	10	10	10	10	10	0	0	8	0	10	0	0	10	10	0	0	0	0	10	10	0
		82	10	0	0	8	10	10	0	0	0	10	10	10	10	10	10	10	10	0	0	10	0	10	0	0	10	10	0	0	10	0	10	10	0
	DOCO	81	10	0	0	0	0	0	0	0	0	10	10	10	10	0	10	0	0	0	0	0	0	0	0	0	0	10	0	0	0	0	10	10	0
	CATE	81	8	0	0	0	0	0	0	0	0	8	8	8	8	0	8	0	0	0	0	0	0	0	0	0	0	8	0	0	0	0	8	8	0
	BCNH	72	1	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	0	0	1	0	0	0	0	1	0	0	0	0	0	1	0	0
		82	12	0	0	11	12	12	0	0	0	12	12	12	12	12	12	12	12	0	0	12	12	12	0	0	0	12	0	0	12	0	12	12	0
5	HERG	81	10	0	0	10	8	10	0	0	0	10	10	10	10	10	10	10	10	0	0	10	0	10	0	0	10	10	0	0	0	0	10	10	0
		82	10	0	0	10	10	10	0	0	0	10	10	10	10	10	10	10	10	0	0	10	10	10	0	0	10	10	0	0	10	0	10	10	0
	DOCO	81	10	0	0	0	0	0	0	0	0	10	10	10	10	0	10	0	0	0	0	0	0	0	0	0	0	10	0	0	0	0	10	10	0
	BCNH	82	1	0	0	1	1	1	0	0	0	1	1	1	1	1	1	1	1	0	0	1	1	1	0	0	0	1	0	0	1	0	1	1	0
6	HERG	71	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		72	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		74	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		76	16	0	0	15	0	15	0	0	0	0	0	0	15	15	15	15	15	1	1	15	0	14	0	0	5	15	13	0	0	0	15	15	0
		77	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		78	8	0	0	8	0	8	0	0	0	0	0	0	8	8	8	8	8	1	1	8	0	8	0	0	8	8	8	0	0	0	8	8	0
		79	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		81	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		82	1	0	0	1	1	1	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	1	1	0	0	0	0	1	1	0
	DOCO	72	7	0	0	0	0	0	0	0	0	0	0	0	7	7	7	7	7	0	0	7	0	0	0	0	7	0	0	0	0	0	7	0	0
		75	1	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	0	0	1	0	0	0	0	1	0	0	0	0	0	1	1	0
7	HERG	76	6	0	0	6	0	5	0	0	0	0	0	0	5	6	6	5	5	0	0	5	0	4	0	0	5	6	0	0	0	0	5	6	0
		77	4	0	0	4	0	4	0	0	0	0	0	0	4	4	4	4	4	0	0	4	0	4	0	0	0	4	4	0	0	0	4	4	0
		78	19	0	0	19	0	19	0	0	0	0	0	0	19	19	19	19	19	0	0	19	0	19	0	0	0	19	19	0	0	0	19	19	0
		80	11	0	0	11	11	11	0	0	0	0	0	0	11	11	11	11	11	0	0	11	11	11	11	1	1	11	11	0	0	0	11	11	0
		82	10	0	0	10	10	10	0	0	0	10	10	10	10	9	9	10	9	0	0	10	0	10	0	0	10	10	0	0	10	0	10	10	0
	COTE	75	4	0	0	0	0	0	0	0	0	0	0	0	4	4	4	4	4	0	0	4	0	0	0	0	4	4	0	0	0	0	4	4	0



Toronto
9
8
10
LAKE ONTARIO
WESTERN LAKE ONTARIO
8. Leslie St. Spit
9. Toronto Island
10. Mugg's Island
11. Hamilton Harbour
12. Niagara River
11
Hamilton
12

Figure 3. Western Lake Ontario and Niagara River colonies of fish-eating birds from which eggs were collected for contaminant analysis.

Table 3. The sample size of eggs analyzed in each year (1970–1988) from Western Lake Ontario and the Niagara River arranged by collection site, species sampled and compound analyzed.

Col. No.	Spec	Yr	% Lip	As	Cd	a-chl	g-chl	o-chl	124 CB	123 CB	135 CB	1234 CB	1236/ 1245 CB	PeCB	HCB	DDD	DDE	DDT	DIEL	DIOXIN	FURAN	HEP EPX	a-hch	b-hch	g-hch	Pb	Hg	MIR	P-MIR	c-non	t-non	OCB	PCB 1260	PCB 1254: 1260	Se
8	HERG	78	4	0	0	3	0	4	0	0	0	0	0	0	4	0	4	4	4	0	0	4	0	4	0	0	0	4	4	0	0	0	4	4	0
		86	1	0	0	1	1	1	0	0	0	1	1	1	1	1	1	1	1	0	0	1	1	1	1	0	0	1	1	1	1	1	1	1	0
9	COTE	73	6	0	0	0	0	0	0	0	0	0	0	0	6	6	6	6	6	0	0	6	0	0	0	0	6	0	0	6	0	0	6	6	0
		81	0	0	0	0	0	0	0	0	0	0	0	0	10	10	10	10	10	0	0	0	0	0	0	0	0	10	0	10	10	0	10	0	0
10	HERG	74	9	0	0	9	0	0	0	0	0	0	0	0	9	9	9	9	9	0	0	9	0	0	0	0	9	9	0	0	0	0	9	9	0
		75	10	0	0	0	0	0	0	0	0	0	0	0	10	10	10	10	10	0	0	10	0	0	0	0	10	10	0	0	0	0	10	10	0
		77	10	10	10	9	0	9	0	0	0	0	0	0	10	10	10	10	10	0	0	9	0	10	0	10	0	10	10	0	0	0	10	10	10
		78	4	0	0	2	0	4	0	0	0	0	0	0	4	0	4	4	4	0	0	4	0	4	0	0	0	4	4	0	0	0	4	4	0
		79	10	0	0	8	0	8	10	10	10	10	10	10	10	10	10	10	10	0	0	8	0	10	0	0	0	10	10	0	0	0	10	10	0
		80	9	0	0	9	0	9	0	0	0	9	9	9	9	9	9	9	9	0	0	9	0	9	0	0	0	9	9	0	0	0	9	9	0
		81	10	0	0	10	0	10	0	0	0	10	10	10	10	10	10	10	10	0	0	10	0	10	0	0	10	10	0	0	0	0	10	10	0
		82	9	0	0	9	9	9	0	0	0	9	9	9	9	9	9	9	9	0	0	9	0	9	0	0	9	9	0	0	9	0	9	9	0
		83	11	0	0	11	11	11	0	0	0	11	11	11	11	11	11	11	11	0	0	11	11	11	0	0	11	11	0	0	11	0	11	11	0
		84	10	0	0	10	10	10	0	0	0	10	10	10	10	10	10	10	10	1	1	10	10	10	0	0	0	10	0	0	10	0	10	10	0
		85	10	0	0	10	10	10	0	0	0	10	10	10	10	10	10	10	10	1	1	10	10	10	0	0	10	0	0	0	10	0	9	10	0
		86	10	0	0	10	0	10	0	0	0	0	0	0	10	10	10	10	10	1	1	10	0	10	0	0	0	10	10	10	10	0	10	10	0
		87	1	0	0	1	1	1	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	1	1	1	1	1	1	1	0
	COTE	72	5	0	0	0	0	0	0	0	0	0	0	0	5	5	5	5	5	0	0	5	0	0	0	0	5	5	0	0	0	0	5	0	0
	RBGU	79	24	0	0	14	0	24	0	0	0	0	0	0	24	24	24	24	24	0	0	24	0	0	0	0	0	24	24	0	0	0	24	24	0
11	HERG	81	10	0	0	10	7	10	0	0	0	10	10	10	10	10	10	10	10	0	0	8	0	10	0	0	10	10	0	0	0	0	10	10	0
		82	1	0	0	1	1	1	0	0	0	1	1	1	1	1	1	1	1	0	0	1	1	1	0	0	1	1	0	0	1	0	1	1	0
		84	1	0	0	1	1	1	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	1	0	0	1	0	1	1	0
		86	1	0	0	1	0	1	0	0	0	0	0	0	1	1	1	1	1	1	1	1	0	1	0	0	0	1	1	1	1	0	1	1	0
		87	1	0	0	1	1	1	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	1	1	1	1	1	1	1	0
	COTE	71	25	0	0	0	0	0	0	0	0	0	0	0	25	25	25	25	25	0	0	25	0	0	0	0	25	0	0	0	0	0	26	0	0
	RBGU	84	10	0	0	10	10	10	0	0	0	10	10	10	10	10	10	10	10	0	0	10	10	10	0	0	0	10	0	0	10	0	10	10	0
12	HERG	79	10	0	0	10	0	10	10	10	10	10	10	10	10	10	10	10	10	0	0	10	0	10	0	0	0	10	10	0	0	0	10	10	0
		81	10	0	0	10	5	10	0	0	0	10	10	10	10	10	10	10	10	1	0	10	0	10	0	0	10	10	0	0	0	0	10	10	0
		82	1	0	0	1	1	1	0	0	0	1	1	1	1	1	1	1	1	1	0	1	1	1	0	0	1	1	0	0	1	0	1	1	0
		83	11	0	0	11	11	11	0	0	0	11	11	11	11	11	11	11	11	1	0	11	11	11	0	0	11	8	0	0	11	0	11	11	0
		84	10	0	0	10	10	10	0	0	0	10	10	10	10	10	10	10	10	1	0	10	10	10	0	0	0	10	0	0	10	0	10	10	0
		85	10	0	0	10	10	10	0	0	0	10	10	10	10	10	10	10	10	1	1	10	10	10	0	0	10	10	0	10	10	0	9	10	0
		86	10	0	0	10	0	10	0	0	0	0	0	0	10	10	10	10	10	1	1	10	0	10	0	0	0	10	10	1	10	1	10	10	0
		87	1	0	0	1	1	1	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	1	1	1	1	1	1	1	0
		88	1	0	0	1	1	1	0	0	0	1	1	1	1	1	1	1	1	0	0	1	1	1	1	0	0	1	1	1	1	1	1	1	0
	BCNH	82	1	0	0	1	0	1	0	0	0	1	1	1	1	1	1	1	1	0	0	1	1	1	0	0	0	1	0	0	1	0	1	1	0
		86	1	0	0	1	0	1	0	0	0	0	0	0	1	1	1	1	1	0	0	1	0	1	0	0	0	1	1	1	1	0	1	1	0

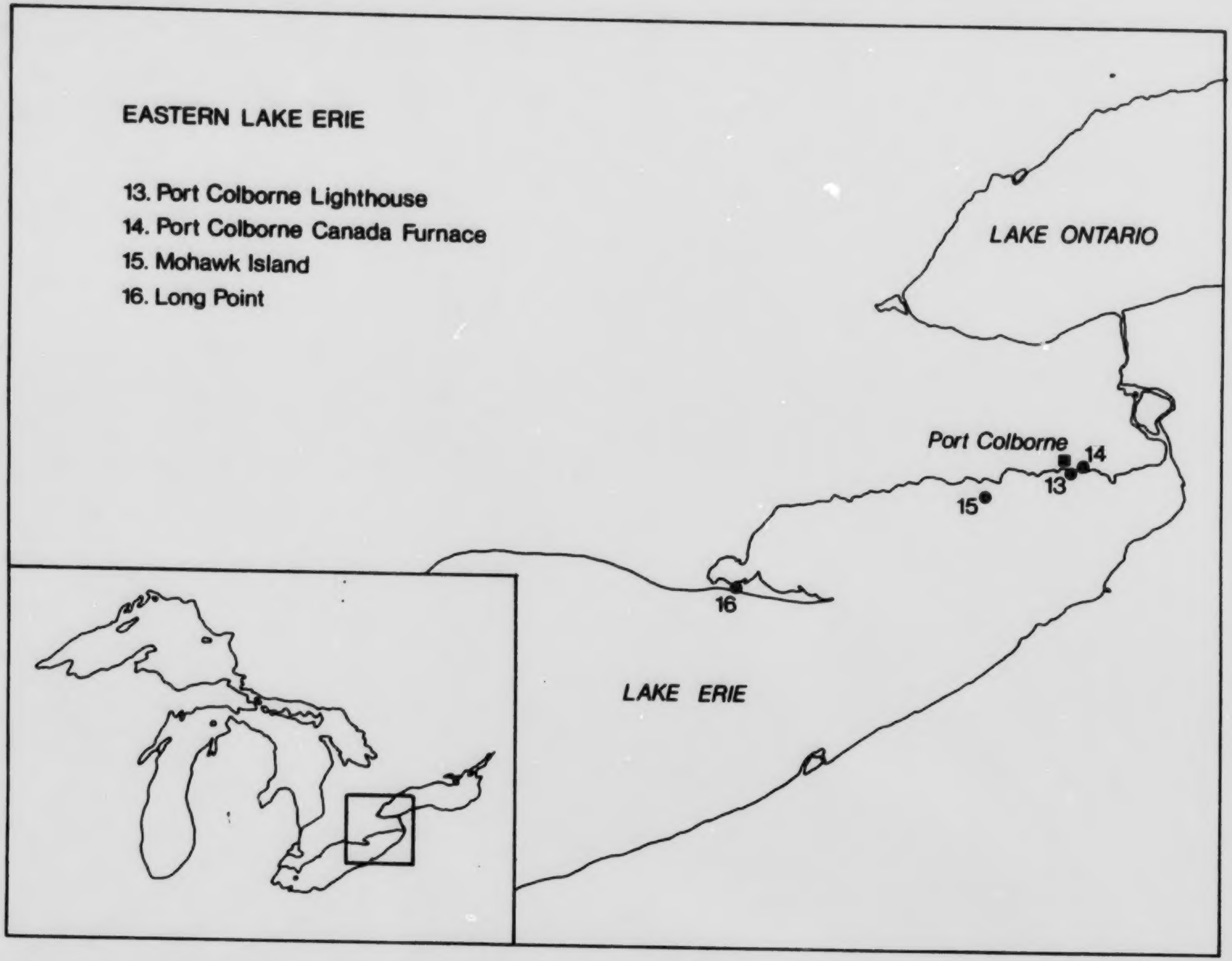

EASTERN LAKE ERIE
13. Port Colborne Lighthouse
14. Port Colborne Canada Furnace
15. Mohawk Island
16. Long Point
LAKE ONTARIO
Port Colborne
14
13
15
16
LAKE ERIE

Figure 4. Eastern Lake Erie colonies of fish-eating birds from which eggs were collected for contaminant analysis.

Table 4. The sample size of eggs analyzed in each year (1970–1988) from Eastern Lake Erie arranged by collection site, species sampled and compound analyzed.

Col. No.	Spec	Yr	% Lip	As	Cd	a- chl	g- chl	o- chl	124 CB	123 CB	135 CB	1234 CB	1235/ 1245 CB	PeCB	HCB	DDD	DDE	DDT	DIEL	DIOXIN	FURAN	HEP EPX	a- hch	b- hch	g- hch	Pb	Hg	MIR	P- MIR	c- non	t- non	OCB	PCB 1260	PCB 1254: 1260	Se
13	COTE	73	6	0	0	0	0	0	0	0	0	0	0	0	6	6	6	6	6	0	0	6	0	0	0	0	0	0	0	0	0	0	6	0	0
14	HERG	74	10	0	0	0	0	0	0	0	0	0	0	0	10	10	10	10	10	0	0	10	0	0	0	0	10	10	0	0	0	0	10	10	0
		75	10	0	0	0	0	0	0	0	0	0	0	0	10	10	10	10	10	0	0	10	0	0	0	0	10	10	0	0	0	0	10	10	0
		77	10	1	1	10	0	10	0	0	0	0	0	0	10	10	10	10	10	0	0	10	0	10	0	1	0	10	10	0	0	0	10	10	1
		78	10	0	0	0	0	10	0	0	0	0	0	0	10	10	10	10	10	0	0	10	0	10	0	0	0	10	10	0	0	0	10	10	0
		79	10	0	0	10	0	10	10	10	10	10	10	10	10	10	10	10	10	0	0	10	0	10	0	0	0	10	10	0	0	0	10	10	0
		80	9	0	0	9	0	9	0	0	0	9	9	9	9	9	9	9	9	0	0	9	0	9	0	0	0	9	0	0	0	0	9	9	0
		81	10	0	0	10	10	10	0	0	0	10	10	10	10	10	10	10	10	0	0	6	0	10	0	0	10	10	0	0	0	0	10	10	0
		82	1	0	0	1	1	1	0	0	0	1	1	1	1	1	1	1	1	0	0	1	1	1	0	0	1	1	0	0	1	0	1	1	0
		83	11	0	0	11	11	11	0	0	0	11	11	11	11	11	11	11	11	0	0	11	11	11	0	0	11	11	0	0	11	0	11	11	0
		84	10	0	0	10	10	10	0	0	0	10	10	10	10	10	10	10	10	1	1	10	10	10	0	0	0	10	0	0	10	0	10	10	0
		85	10	0	0	10	10	10	0	0	0	10	10	10	10	10	10	10	10	1	1	10	10	10	0	0	10	10	0	0	10	0	0	10	0
		86	1	0	0	1	0	1	0	0	0	0	0	0	1	1	1	1	1	1	1	1	0	0	0	0	0	1	1	1	1	0	1	1	0
		87	10	0	0	10	10	10	0	0	0	10	10	10	10	10	10	10	10	1	0	10	10	10	10	0	0	10	10	10	10	10	10	10	0
		88	1	0	0	1	1	1	0	0	0	1	1	1	1	1	1	1	1	0	0	1	1	1	1	0	0	1	1	1	1	1	1	1	0
	COTE	72	4	0	0	0	0	0	0	0	0	0	0	0	4	4	4	4	4	0	0	4	0	0	0	0	4	0	0	0	0	0	4	0	0
		73	2	0	0	0	0	0	0	0	0	0	0	0	2	2	2	2	2	0	0	2	0	0	0	0	2	0	0	0	0	0	2	0	0
15	HERG	78	10	0	0	0	0	10	0	0	0	0	0	0	10	0	10	10	10	0	0	10	0	10	0	0	0	10	10	0	0	0	10	10	0
16	FOTE	88	1	0	0	1	0	1	0	0	0	0	0	0	1	1	1	1	1	0	0	1	0	1	0	0	0	1	1	1	1	0	1	1	0

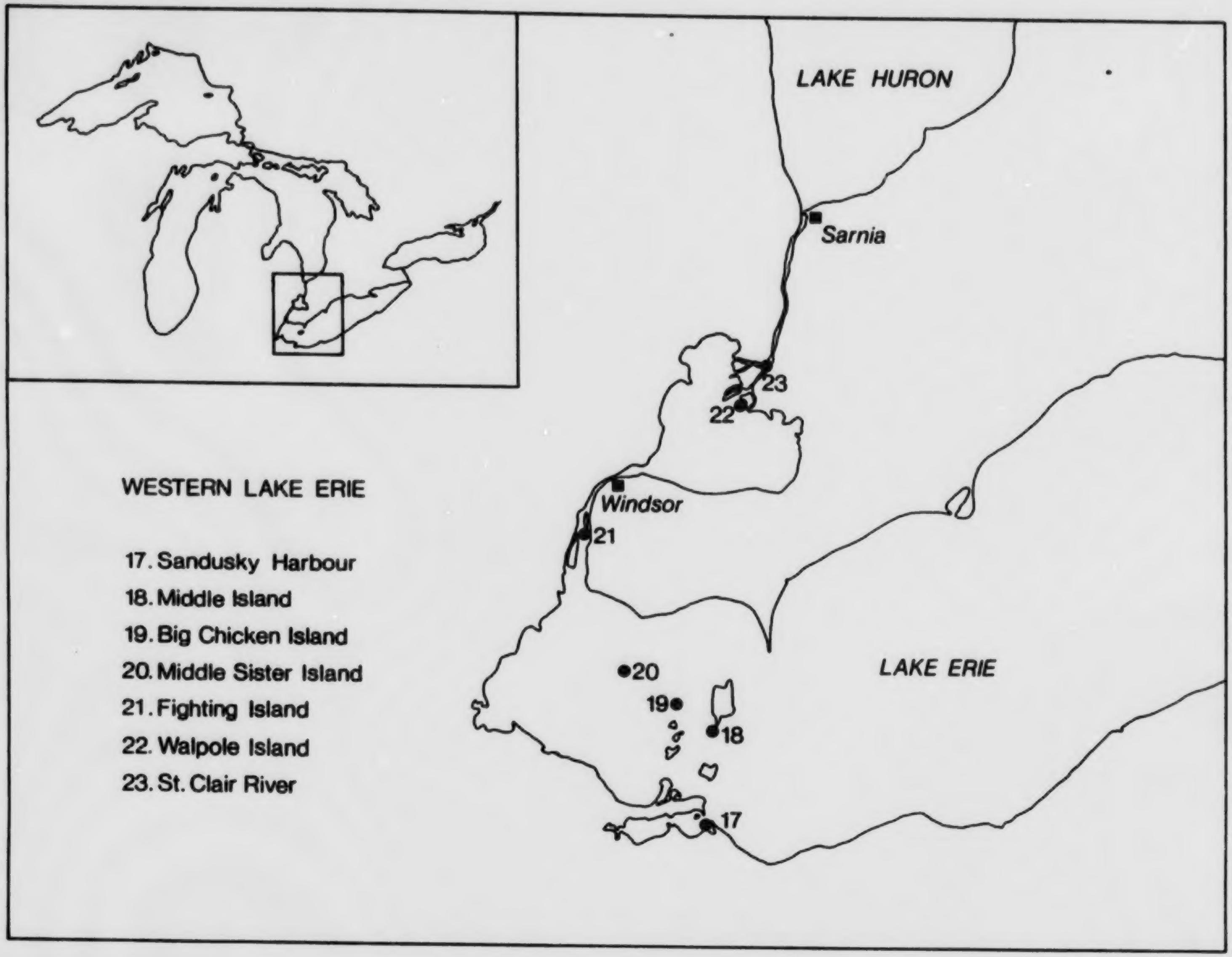

LAKE HURON
Sarnia
23
22
Windsor
21
LAKE ERIE
•20
19•
18
17
WESTERN LAKE ERIE
17. Sandusky Harbour
18. Middle Island
19. Big Chicken Island
20. Middle Sister Island
21. Fighting Island
22. Walpole Island
23. St. Clair River

Figure 5. Western Lake Erie, Lake St. Clair and Detroit River colonies of fish-eating birds from which eggs were collected for contaminant analysis.

Table 5. The sample size of eggs analyzed in each year (1970–1988) from Western Lake Erie, Lake St.Clair and the Detroit River arranged by collection site, species sampled, and compound analyzed.

Col. No.	Spec	Yr	% Lip	As	Cd	a-chl	g-chl	o-chl	134 CB	123 CB	136 CB	1234 CB	1236/ 1245 CB	PeCB	HCB	DDD	DDE	DDT	DIEL	DIOXIN	FURAN	HEP EPX	a-hch	b-hch	g-hch	Pb	Hg	MIR	P-MIR	c-non	t-non	OCS	PCB 1260	PCB 1254: 1260	Se
17	HERG	79	10	0	0	10	0	10	10	10	10	10	10	10	10	10	10	10	10	0	0	9	0	10	0	0	0	10	10	0	0	0	10	10	0
18	HERG	74	10	0	0	0	0	0	0	0	0	0	0	0	10	10	10	10	10	0	0	10	0	0	0	0	10	10	0	0	0	0	10	10	0
		75	10	0	0	0	0	0	0	0	0	0	0	0	10	10	10	10	10	0	0	10	0	0	0	0	10	10	0	0	0	0	10	10	0
		77	10	1	1	10	0	10	0	0	0	0	0	0	10	10	10	10	10	0	0	10	0	10	0	1	0	10	10	0	0	0	10	10	1
		78	10	0	0	0	0	10	0	0	0	0	0	0	10	0	10	10	10	0	0	10	0	10	0	0	0	10	10	0	0	0	10	10	0
		79	10	0	0	10	0	10	10	10	10	10	10	10	10	10	10	10	10	0	0	10	0	10	0	0	0	10	10	0	0	0	10	10	0
		80	10	0	0	10	0	10	0	0	0	10	10	10	10	10	10	10	10	0	0	10	0	10	0	0	0	10	0	0	0	0	10	10	0
		81	10	0	0	10	7	10	0	0	0	10	10	10	10	10	10	10	10	1	0	9	0	10	0	0	10	10	0	0	0	0	10	10	0
		82	10	0	0	10	10	10	0	0	0	10	10	10	10	10	10	10	10	1	0	10	0	10	0	0	10	10	0	0	10	0	10	10	0
		83	10	0	0	10	10	10	0	0	0	10	10	10	10	10	10	10	10	1	0	10	10	10	0	0	10	10	0	0	10	0	10	10	0
		84	10	0	0	10	10	10	0	0	0	10	10	10	10	10	10	10	10	1	1	10	10	10	0	0	0	10	0	0	10	0	10	10	0
		85	10	0	0	10	10	10	0	0	0	10	10	10	10	10	10	10	10	1	1	10	10	10	0	0	10	10	0	0	10	0	0	10	0
		86	1	0	0	1	0	1	0	0	0	0	0	0	1	1	1	1	1	1	1	1	0	1	0	0	0	1	1	1	1	0	1	1	0
		87	10	0	0	10	10	10	0	0	0	0	10	10	10	10	10	10	10	1	1	10	10	10	10	0	0	10	10	10	10	10	10	10	0
		88	1	0	0	1	1	1	0	0	0	0	1	1	10	1	1	1	1	0	0	1	1	1	1	0	0	1	1	1	1	1	1	1	0
	BCNH	82	10	0	0	10	10	10	0	0	0	0	10	10	10	10	10	10	10	0	0	10	10	10	0	0	0	10	0	0	10	0	10	10	0
		86	1	0	0	1	0	1	0	0	0	0	0	0	1	1	1	1	1	0	0	1	0	1	0	0	0	1	1	1	1	0	1	1	0
19	DCCO	72	18	0	0	0	0	0	0	0	0	0	0	0	18	18	18	18	18	0	0	18	0	0	0	0	18	0	0	0	0	0	18	0	0
		79	10	0	0	10	0	9	0	0	0	0	0	0	10	10	10	10	10	0	0	10	0	10	0	0	0	10	10	0	0	0	10	10	0
		81	10	0	0	0	0	0	0	0	0	10	10	10	10	0	10	0	0	0	0	0	0	0	0	0	0	10	0	0	0	0	10	10	0
		83	1	0	0	1	1	1	0	0	0	1	1	1	1	1	1	1	1	0	0	1	1	1	0	0	0	1	0	0	1	0	1	1	0
20	HERG	78	44	0	0	0	0	44	0	0	0	0	0	0	44	0	44	44	44	0	0	44	0	44	0	0	0	44	44	0	0	0	44	44	0
21	HERG	72	2	0	0	0	0	0	0	0	0	0	0	0	2	2	2	2	2	0	0	2	0	0	0	0	2	0	0	0	0	0	2	0	0
		78	11	0	0	0	0	11	0	0	0	0	0	0	11	0	11	11	11	0	0	11	0	11	0	0	0	11	11	0	0	0	11	11	0
		79	45	0	0	10	0	44	10	10	10	10	10	10	45	45	45	45	45	0	0	37	0	45	0	0	0	10	10	0	0	0	45	45	0
		81	10	0	0	10	7	10	0	0	0	10	10	10	10	10	10	10	10	1	0	6	0	10	0	0	10	10	0	0	0	0	10	10	0
		82	20	0	0	20	20	20	0	0	0	20	20	20	20	20	20	20	20	1	0	20	10	20	0	0	20	20	0	0	20	0	20	20	0
		83	11	0	0	11	11	11	0	0	0	11	11	11	11	11	11	11	11	1	0	11	11	11	0	0	11	11	0	0	11	0	11	11	0
		84	10	0	0	10	10	10	0	0	0	10	10	10	10	10	10	10	10	1	1	10	10	10	0	0	0	10	0	0	10	0	10	10	0
		85	10	0	0	10	10	10	0	0	0	10	10	10	10	10	10	10	10	1	1	10	10	10	0	0	10	10	0	0	10	0	0	10	0
		86	1	0	0	1	0	1	0	0	0	0	0	0	1	1	1	1	1	1	1	1	0	1	0	0	0	1	1	1	1	0	1	1	0
		87	10	0	0	10	10	10	0	0	0	10	10	10	10	10	10	10	10	1	1	10	10	10	10	0	0	10	10	10	10	10	10	10	0
		88	1	0	0	1	1	1	0	0	0	1	1	1	1	1	1	1	1	0	0	1	1	1	1	0	0	1	1	1	1	1	1	1	0
	COTE	72	3	0	0	0	0	0	0	0	0	0	0	0	3	3	3	3	3	0	0	3	0	0	0	0	3	3	0	0	0	0	3	0	0
		79	10	0	0	3	0	10	0	0	0	0	0	0	10	10	10	10	10	0	0	10	0	10	0	0	0	10	10	0	0	0	10	10	0
	RBGU	79	10	0	0	2	0	6	0	0	0	0	0	0	10	10	10	10	10	0	0	10	0	10	0	0	0	10	10	0	0	0	10	10	0
		84	10	0	0	10	10	10	0	0	0	10	10	10	10	10	10	10	10	0	0	10	10	10	0	0	0	10	0	0	10	0	10	10	0
22	BCNH	86	1	0	0	1	0	1	0	0	0	0	0	0	1	1	1	1	1	0	0	1	0	1	0	0	0	1	1	1	1	0	1	1	0
	FOTE	86	1	0	0	1	0	1	0	0	0	0	0	0	1	1	1	1	1	0	0	1	0	1	0	0	0	1	1	1	1	0	1	1	0
23	HERG	87	1	0	0	1	1	1	0	0	0	1	1	1	1	1	1	1	1	0	0	1	1	1	1	0	0	1	1	1	1	1	1	1	0

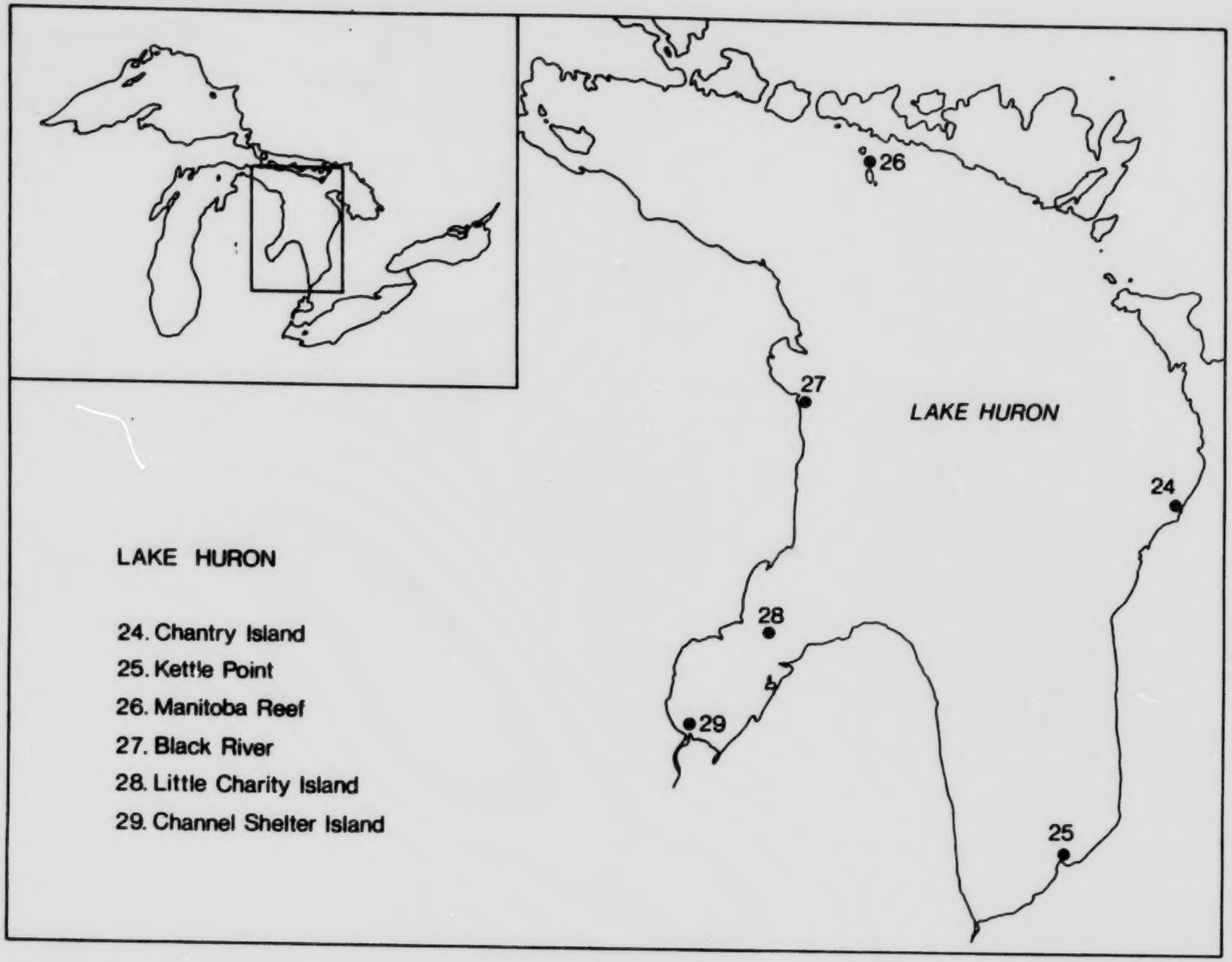

LAKE HURON
24
25
26
27
28
29
LAKE HURON
24. Chantry Island
25. Kettle Point
26. Manitoba Reef
27. Black River
28. Little Charity Island
29. Channel Shelter Island

Figure 6. Lake Huron colonies of fish-eating birds from which eggs were collected for contaminant analysis.

Table 6. The sample size of eggs analyzed in each year (1970–1988) from Lake Huron arranged by collection site, species sampled, and compound analyzed.

Col. No.	Spec	Yr	% Lip	As	Cd	a-chl	g-chl	o-chl	124 CB	123 CB	135 CB	1234 CB	1235/ 1245 CB	PeCB	HCB	DDD	DDE	DDT	DIEL	DIOXIN	FURAN	HEP EPX	a-hch	b-hch	g-hch	Pb	Hg	MIR	P-MIR	c-non	t-non	OCS	PCB 1260	PCB 1254: 1260	Se
24	HERG	74	10	0	0	0	0	0	0	0	0	0	0	0	10	10	10	10	10	0	0	10	0	0	0	0	10	10	0	0	0	0	10	10	0
		75	10	0	0	0	0	0	0	0	0	0	0	0	10	10	10	10	10	0	0	10	0	0	0	0	10	10	0	0	0	0	10	10	0
		77	10	1	1	10	0	10	0	0	0	0	0	0	10	10	10	10	10	0	0	10	0	10	0	1	0	10	0	0	0	0	10	10	1
		78	15	0	0	5	0	15	0	0	0	0	0	0	15	5	15	15	15	0	0	15	0	15	0	0	0	15	10	0	0	0	15	15	0
		79	10	0	0	10	0	10	0	0	0	10	0	0	10	10	10	10	10	0	0	10	0	10	0	0	0	10	15	0	0	0	10	10	0
		80	10	0	0	10	0	10	10	10	0	10	10	10	10	10	10	10	10	0	0	10	0	10	0	0	0	10	10	0	0	0	10	10	0
		81	10	0	0	10	10	10	0	0	0	10	10	10	10	10	10	10	10	1	0	9	0	10	0	0	9	10	0	0	0	0	10	10	0
		82	10	0	0	3	10	10	0	0	0	10	10	10	10	10	10	10	10	1	0	10	0	10	0	0	10	10	9	0	10	0	10	10	0
		83	11	0	0	11	11	11	0	0	0	11	11	11	11	11	11	11	11	1	0	11	11	11	0	0	11	11	0	0	11	0	11	11	0
		84	10	0	0	10	10	10	0	0	0	10	10	10	10	10	10	10	10	1	1	10	10	10	0	0	0	10	0	0	10	0	10	10	0
		85	10	0	0	10	10	10	0	0	0	10	10	10	10	10	10	10	10	1	1	10	10	10	0	0	10	10	0	0	10	0	0	0	0
		86	1	0	0	1	0	1	0	0	0	0	0	0	1	1	1	1	1	1	1	1	0	1	0	0	0	1	1	1	1	0	1	1	0
		87	1	0	0	1	1	1	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	1	1	1	1	1	1	1	0
		88	13	0	0	13	13	13	0	0	0	13	13	13	13	13	13	13	13	0	0	13	13	13	13	0	0	13	13	13	13	13	13	13	0
	BCNH	82	1	0	0	0	1	1	0	0	0	1	1	1	1	1	1	1	1	0	0	1	1	1	0	0	0	1	0	0	1	0	1	1	0
25	COTE	72	2	0	0	0	0	0	0	0	0	0	0	0	2	2	2	2	2	0	0	2	0	0	0	0	0	0	0	0	0	0	2	0	0
26	HERG	80	10	0	0	0	0	0	0	10	0	10	10	10	10	0	10	0	0	0	0	0	0	0	0	0	0	10	0	0	0	0	10	10	0
27	HERG	80	10	0	0	0	0	0	0	0	0	10	10	10	10	0	10	0	0	0	0	0	0	0	0	0	0	10	0	0	0	0	10	10	0
28	HERG	80	10	0	0	0	0	0	0	0	0	10	10	10	10	0	10	0	0	0	0	0	0	0	0	0	0	10	0	0	0	0	10	10	0
29	HERG	80	10	0	0	0	0	0	0	0	0	10	10	10	10	0	10	0	0	0	0	0	0	0	0	0	0	10	0	0	0	0	10	10	0
		81	10	0	0	10	2	10	0	0	0	10	10	10	10	9	10	10	10	1	0	2	0	10	0	0	10	10	0	0	0	0	10	10	0
		82	10	0	0	10	8	10	0	0	0	10	10	10	10	9	10	10	10	1	0	10	0	10	0	0	10	10	0	0	10	0	10	10	0
		83	11	0	0	11	11	11	0	0	0	11	11	11	11	11	11	11	11	1	0	11	11	11	0	0	11	11	0	0	11	0	11	11	0
		84	10	0	0	10	10	10	0	0	0	10	10	10	10	10	10	10	10	1	1	10	10	10	0	0	0	10	0	0	10	0	10	10	0
		85	10	0	0	10	10	10	0	0	0	10	10	10	10	10	10	10	10	1	1	10	10	10	0	0	10	10	0	0	10	0	0	10	0
		86	1	0	0	1	0	1	0	0	0	0	0	0	1	1	1	1	1	1	1	1	0	1	0	0	0	1	1	1	1	0	1	1	0
		87	1	0	0	1	1	1	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	1	1	1	1	1	1	1	0
		88	16	0	0	16	16	16	0	0	0	16	16	16	16	16	16	16	16	0	0	16	16	16	16	0	0	16	16	16	16	16	16	16	0

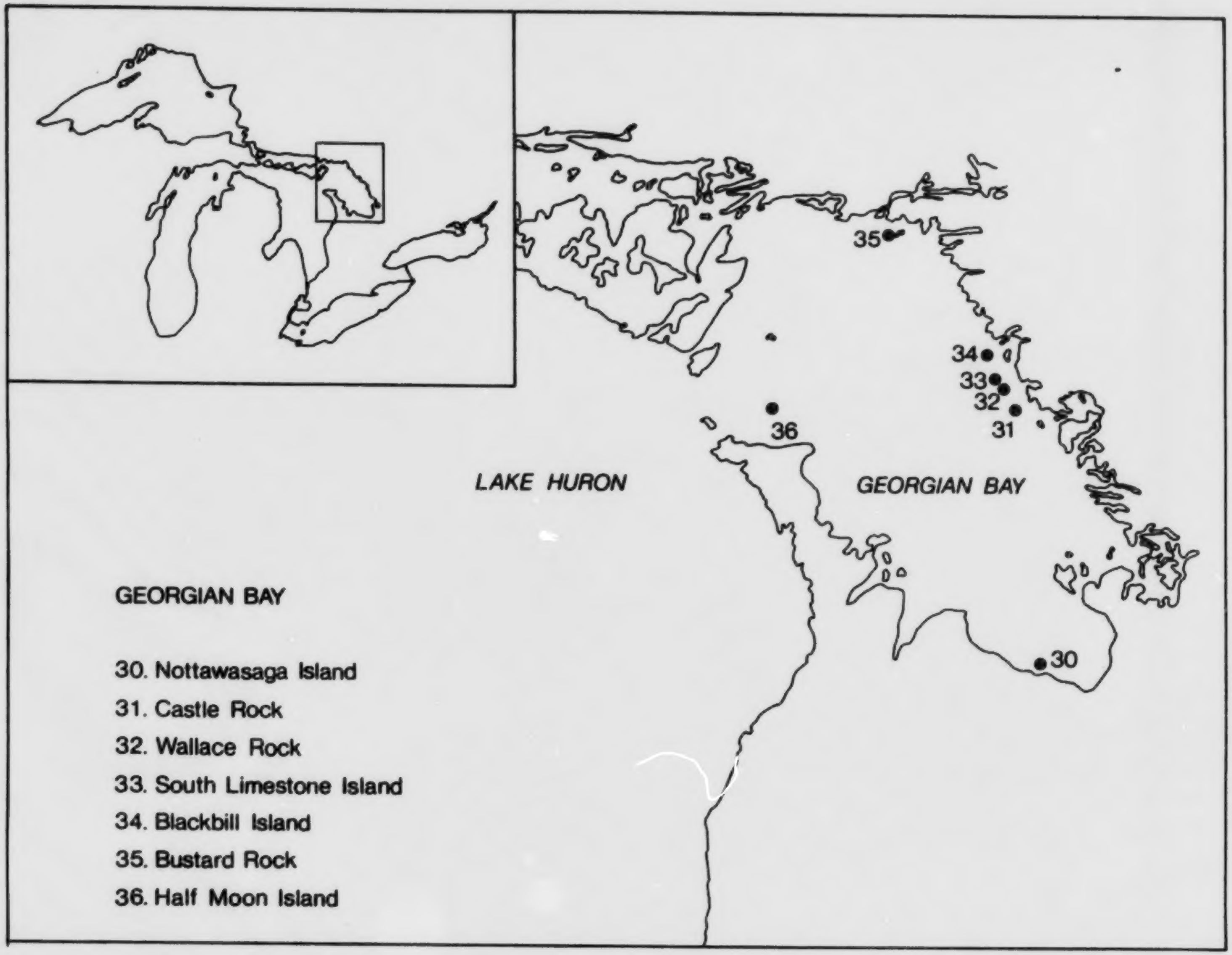

35
34
33
32
31
36
30
LAKE HURON
GEORGIAN BAY
GEORGIAN BAY
30. Nottawasaga Island
31. Castle Rock
32. Wallace Rock
33. South Limestone Island
34. Blackbill Island
35. Bustard Rock
36. Half Moon Island

Figure 7. Georgian Bay colonies of fish-eating birds from which eggs were collected for contaminant analysis.

Table 7. The sample size of eggs analyzed in each year (1970–1988) from Georgian Bay arranged by collection site, species sampled, and compound analyzed.

Col. No.	Spec	Yr	% Lip	As	Cd	a-chl	g-chl	o-chl	124 CB	123 CB	135 CB	1234 CB	1236/ 1245 CB	PeCB	HCB	DDD	DDE	DDT	DIEL	DIOXIN	FURAN	HEP EPX	a-hch	b-hch	g-hch	Pb	Hg	MIR	P-MIR	c-non	t-non	OCS	PCB 1260	PCB 1254: 1260	Se
30	HERG	80	10	0	0	0	0	0	0	0	0	10	10	10	10	0	10	0	0	0	0	0	0	0	0	0	0	10	0	0	0	0	10	10	0
31	HERG	80	10	0	0	0	0	0	0	0	0	10	10	10	10	0	10	0	0	0	0	0	0	0	0	0	0	10	0	0	0	0	10	10	0
32	DCCO	71	2	0	0	0	0	0	0	0	0	0	0	0	2	2	2	2	2	0	0	2	0	0	0	0	2	0	0	0	0	0	2	0	0
		72	3	0	0	0	0	0	0	0	0	0	0	0	3	3	3	3	3	0	0	3	0	0	0	0	3	0	0	0	0	0	3	0	0
		73	1	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	0	0	1	0	0	0	0	1	0	0	0	0	0	1	0	0
33	HERG	76	2	0	0	2	0	2	0	0	0	0	0	0	2	2	2	2	2	0	0	2	0	0	0	0	2	2	2	0	0	0	2	2	0
	CATE	72	1	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	0	0	1	0	0	0	0	1	0	0	0	0	0	1	0	0
		80	10	0	0	0	0	0	0	0	0	10	10	10	10	0	10	0	0	0	0	0	0	0	0	0	0	10	0	0	0	0	10	10	0
	COTE	81	0	0	0	0	0	10	0	0	0	0	0	0	10	10	10	10	10	0	0	0	0	0	0	0	0	10	0	10	10	0	10	0	0
34	DCCO	70	7	0	0	0	0	0	0	0	0	0	0	0	0	7	7	7	7	0	0	7	0	0	0	0	0	9	0	0	0	0	7	0	0
		71	8	0	0	0	0	0	0	0	0	0	0	0	8	8	8	8	8	0	0	8	0	0	0	0	7	0	0	0	0	0	6	0	0
35	HERG	72	3	0	0	0	0	0	0	0	0	0	0	0	3	3	3	3	3	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0
36	CATE	80	9	0	0	0	0	0	0	0	0	9	9	9	9	0	9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9	0	0

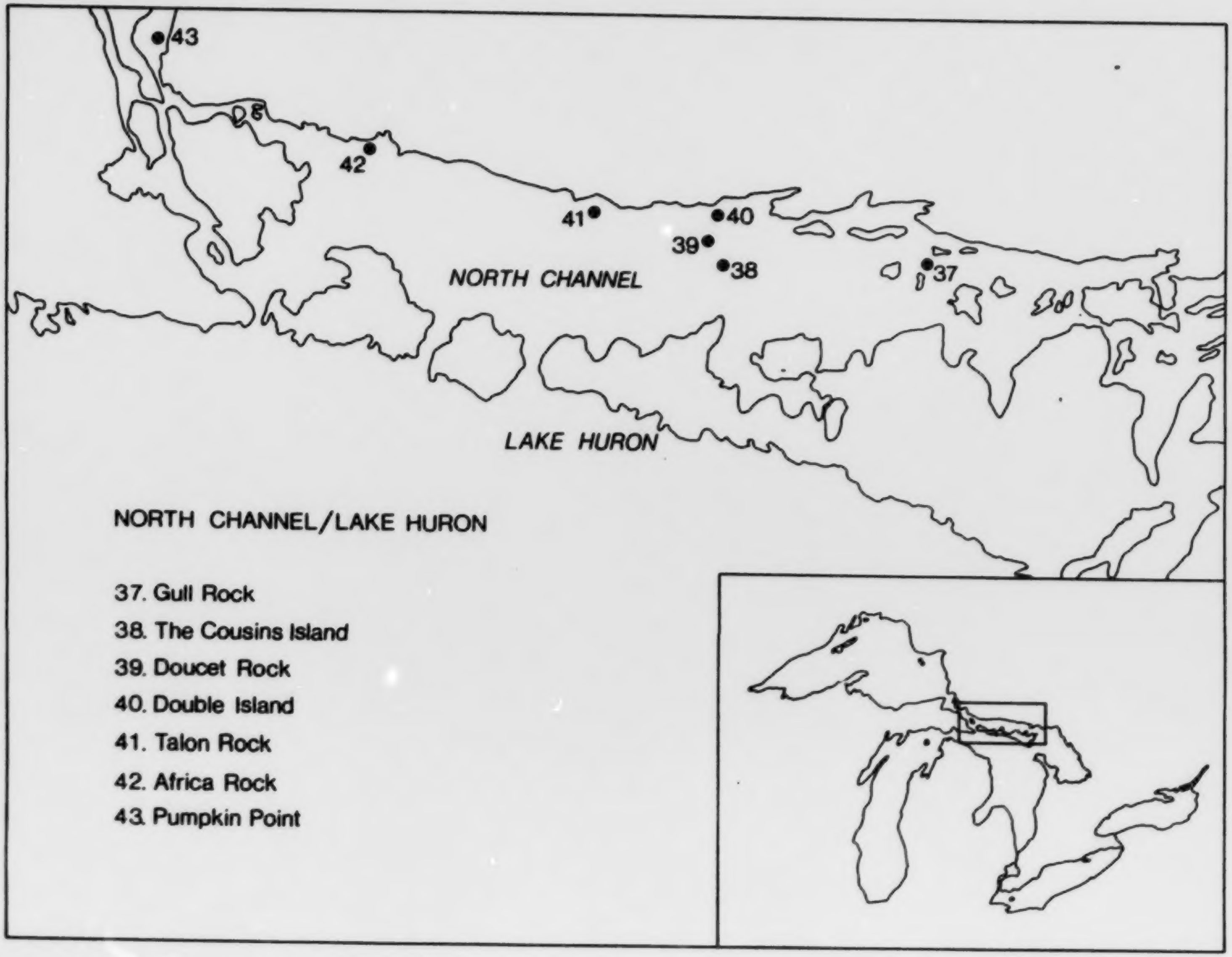

43
42
41
40
39
38
37
NORTH CHANNEL
LAKE HURON
NORTH CHANNEL/LAKE HURON
37. Gull Rock
38. The Cousins Island
39. Doucet Rock
40. Double Island
41. Talon Rock
42. Africa Rock
43. Pumpkin Point

Figure 8. North Channel, Lake Huron colonies of fish-eating birds from which eggs were collected for contaminant analysis.

Table 8. The sample size of eggs analyzed in each year (1970–1988) from North Channel, Lake Huron arranged by collection site, species sampled, and compound analyzed.

Col. No.	Spec	Yr	% Lip	As	Cd	a-chl	g-chl	o-chl	124 CB	123 CB	136 CB	1234 CB	1236/ 1345 CB	PeCB	HCB	DDD	DDE	DDT	DIEL	DIOXIN	FURAN	HEP EPX	a-hch	b-hch	g-hch	Pb	Hg	MIR	P-MIR	c-non	t-non	OCS	PCB 1260	PCB 1254: 1260	Se
37	DOCO	72	9	0	0	0	0	0	0	0	0	0	0	0	9	9	9	9	9	0	0	9	0	0	0	0	0	0	0	0	0	0	9	0	0
		75	1	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	0	0	1	0	0	0	0	0	0	0	0	0	0	1	1	0
38	CATE	80	10	0	0	0	0	0	0	0	0	0	0	0	10	0	10	0	0	0	0	0	0	0	0	0	0	10	0	10	0	0	10	10	0
39	DOCO	71	7	0	0	0	0	0	0	0	0	0	0	0	0	7	7	7	7	0	0	7	0	0	0	0	7	0	0	0	0	0	7	0	0
		72	2	0	0	0	0	0	0	0	0	0	0	0	0	2	2	2	2	0	0	2	0	0	0	0	2	0	0	0	0	0	2	0	0
		75	1	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0	0	1	0	0	0	0	1	0	0	0	0	0	1	0	0
40	HERG	74	10	0	0	0	0	0	0	0	0	0	0	0	10	10	10	10	10	0	0	10	0	0	0	0	10	10	0	0	0	0	10	10	0
		75	10	0	0	0	0	0	0	0	0	0	0	0	10	10	10	10	10	0	0	10	0	0	0	0	10	10	0	0	0	0	10	10	0
		77	10	1	1	10	0	10	0	0	0	0	0	0	10	10	10	10	10	0	0	10	0	10	0	1	0	10	10	0	0	0	10	10	1
		78	10	0	0	0	0	0	0	0	0	0	0	0	10	0	10	10	10	0	0	10	0	10	0	0	0	10	10	0	0	0	10	10	0
		79	10	0	0	10	0	10	10	10	10	10	10	10	10	10	10	10	10	0	0	10	0	10	0	0	0	10	10	0	0	0	10	10	0
		80	10	0	0	10	0	10	0	0	0	10	10	10	10	10	10	10	10	0	0	10	0	7	0	0	0	10	0	0	0	0	10	10	0
		81	10	0	0	10	5	10	0	0	0	10	10	10	10	10	10	10	10	0	0	9	0	10	0	0	10	10	0	0	0	0	10	10	0
		82	10	0	0	10	10	10	0	0	0	10	10	10	10	7	10	10	10	0	0	10	10	10	0	0	10	10	0	0	10	0	10	10	0
		83	11	0	0	11	11	11	0	0	0	11	11	11	11	11	11	11	11	0	0	11	11	11	0	0	11	11	0	0	11	0	11	11	0
		84	10	0	0	10	10	10	0	0	0	10	10	10	10	10	10	10	10	1	1	10	10	10	0	0	0	10	0	0	10	0	10	10	0
		85	10	0	0	10	10	10	0	0	0	10	10	10	10	10	10	10	10	1	1	10	10	10	0	0	10	10	0	0	10	0	10	10	0
		86	1	0	0	1	1	1	0	0	0	0	0	0	1	1	1	1	1	1	1	1	0	1	0	0	0	1	1	1	1	0	1	1	0
		87	1	0	0	1	1	1	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	1	1	1	1	1	1	1	0
		88	13	0	0	13	13	13	0	0	0	13	13	13	13	13	13	13	13	13	13	13	13	13	13	0	0	13	13	13	13	13	13	13	0
41	DOCO	71	3	0	0	0	0	0	0	0	0	0	0	0	3	3	3	3	3	0	0	0	0	0	0	0	3	0	0	0	0	0	3	0	0
		72	1	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0
42	DOCO	73	1	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	0	0	1	0	0	0	0	1	0	0	0	0	0	1	0	0
		75	2	0	0	0	0	0	0	0	0	0	0	0	2	2	2	2	2	0	0	2	0	0	0	0	2	0	0	0	0	0	2	2	0
		79	9	0	0	9	0	9	0	0	0	0	0	0	9	9	9	9	9	0	0	9	0	0	0	0	0	9	9	0	0	0	9	9	0
43	HERG	80	10	0	0	0	0	0	0	0	0	10	10	0	10	0	10	0	0	0	0	0	0	0	0	0	0	10	0	0	0	0	10	0	0
		85	10	0	0	10	10	10	0	0	0	10	10	0	10	10	10	10	10	1	1	10	10	10	0	0	10	10	0	1	10	0	10	0	0
		86	1	0	0	1	1	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	0	1	0	0	0	1	1	1	1	1	1	0	0

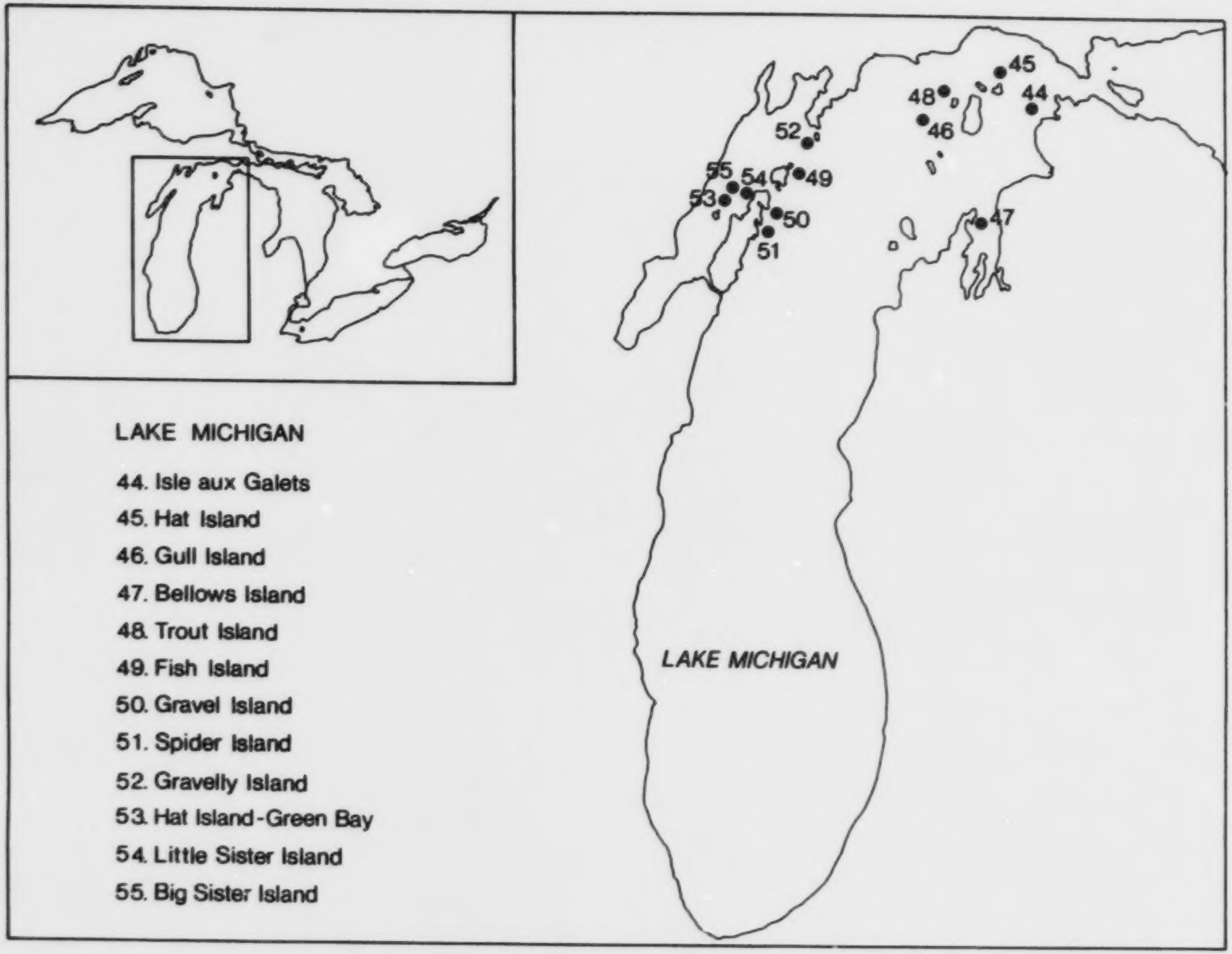

LAKE MICHIGAN
44. Isle aux Galets
45. Hat Island
46. Gull Island
47. Bellows Island
48. Trout Island
49. Fish Island
50. Gravel Island
51. Spider Island
52. Gravelly Island
53. Hat Island-Green Bay
54. Little Sister Island
55. Big Sister Island
LAKE MICHIGAN
44
45
46
47
48
49
50
51
52
53
54
55

Figure 9. Lake Michigan colonies of fish-eating birds from which eggs were collected for contaminant analysis.

Table 8. The sample size of eggs analyzed in each year (1970–1988) from Lake Michigan arranged by collection site, species sampled, and compound analyzed.

Col. No.	Spec	Yr	% Lip	As	Cd	a-chl	g-chl	o-chl	124 CB	123 CB	135 CB	1234 CB	1235/1245 CB	PeCB	HCB	DDD	DDE	DDT	DIEL	DIOXIN	FURAN	HEP EPX	a-hch	b-hch	g-hch	Pb	Hg	MIR	P-MIR	c-non	t-non	OCS	PCB 1260	PCB 1254:1260	Se
44	CATE	80	9	0	0	0	0	0	0	0	0	9	9	9	9	0	9	0	0	0	0	0	0	0	0	0	0	9	0	0	0	0	9	9	0
45	HERG	77	9	1	1	9	0	9	0	0	0	0	0	0	9	9	9	9	9	0	0	9	0	9	0	1	9	9	9	9	0	0	9	9	1
	CATE	80	9	0	0	0	0	0	0	0	0	9	9	9	9	0	9	0	0	0	0	0	0	0	0	0	0	9	0	0	0	0	9	9	0
46	HERG	78	10	0	0	4	0	10	0	0	0	0	0	0	10	0	10	10	10	0	0	10	0	10	0	0	0	10	9	0	0	0	10	10	0
		79	10	0	0	10	0	10	0	0	0	0	0	0	10	10	10	10	10	0	0	6	0	10	0	0	0	10	10	0	0	0	10	10	0
		80	10	0	0	10	0	10	0	0	0	10	10	10	10	10	10	10	10	0	0	10	0	10	0	0	0	10	0	0	0	0	10	10	0
		81	9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	9	0	0
		82	10	0	0	10	10	10	0	0	0	10	10	10	10	6	10	10	10	1	1	10	0	10	0	0	10	10	0	0	10	0	10	10	0
		83	11	0	0	11	11	11	0	0	0	11	11	11	11	11	11	11	11	1	1	11	11	11	0	0	11	11	0	0	11	0	11	11	0
		84	10	0	0	10	10	10	0	0	0	10	10	10	10	10	10	10	10	1	1	10	10	10	0	0	0	10	0	0	10	0	10	10	0
		85	9	0	0	9	9	9	0	0	0	9	9	9	9	9	9	9	9	1	1	9	9	9	0	0	9	9	9	0	9	0	6	9	0
		87	1	0	0	1	1	1	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	1	1	1	1	0	1	1	0
		88	1	0	0	1	1	1	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	1	1	1	1	1	1	1	0
47	HERG	78	10	0	0	6	0	10	0	0	0	0	0	0	10	0	10	10	10	0	0	10	0	10	0	0	0	10	10	0	0	0	10	10	0
48	HERG	88	1	0	0	1	0	1	0	0	0	0	0	0	1	1	1	1	1	1	1	1	0	1	0	0	0	1	1	1	1	0	1	1	0
49	HERG	84	1	0	0	1	1	1	0	0	0	1	1	1	1	1	1	1	1	0	0	1	1	1	0	0	0	1	0	0	1	0	1	1	0
50	HERG	84	1	0	0	1	1	1	0	0	0	1	1	1	1	1	1	1	1	0	0	1	1	1	0	0	0	1	0	0	1	0	1	1	0
51	HERG	84	1	0	0	1	1	1	0	0	0	1	1	1	1	1	1	1	1	0	0	1	1	1	0	0	0	1	0	0	1	0	1	1	0
52	CATE	80	10	0	0	0	0	0	0	0	0	10	10	10	10	0	10	0	0	0	0	0	0	0	0	0	0	10	0	0	0	0	10	10	0
53	HERG	84	1	0	0	1	1	1	0	0	1	1	1	1	1	1	1	1	1	0	0	1	1	1	0	0	0	0	0	0	1	0	1	1	0
54	HERG	77	10	1	1	10	0	10	0	0	0	0	0	0	10	10	10	10	10	0	0	10	0	10	0	1	0	10	10	0	0	0	10	10	1
55	HERG	71	9	0	0	0	0	10	0	0	0	10	10	10	10	10	10	10	10	1	1	10	0	10	0	0	0	10	0	0	0	0	10	10	0
		72	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		73	10	0	0	0	0	10	0	0	0	10	10	10	10	10	10	10	10	1	1	10	0	10	0	0	0	10	0	0	0	0	10	10	0
		74	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		75	10	0	0	10	0	10	0	0	0	10	10	10	10	10	10	10	10	1	1	10	0	10	0	0	0	10	0	0	0	0	10	10	0
		77	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		78	10	0	0	10	0	10	0	0	0	0	0	0	10	0	10	10	10	0	0	10	0	10	0	0	0	10	10	0	0	0	10	10	0
		79	10	0	0	10	0	10	0	0	0	0	0	0	10	10	10	10	10	0	0	6	0	10	0	0	0	10	10	0	0	0	10	10	0
		80	10	0	0	10	0	10	0	0	0	10	10	10	10	10	10	10	10	1	1	10	0	10	0	0	0	10	0	0	0	0	10	10	0
		82	10	0	0	10	10	10	0	0	0	10	10	10	10	9	10	10	10	1	1	10	10	10	0	0	10	10	0	0	10	1	10	10	0
		83	10	0	0	10	10	10	0	0	0	10	10	10	10	10	10	10	10	0	0	10	10	10	0	0	10	10	0	0	10	0	10	10	0
		84	10	0	0	10	10	10	0	0	0	10	10	10	10	10	10	10	10	1	1	10	10	10	0	0	0	10	0	0	10	0	10	10	0
		85	10	0	0	10	10	10	0	0	0	10	10	10	10	10	10	10	10	0	0	10	10	10	0	0	10	10	0	0	10	0	0	10	0
		86	1	0	0	1	0	1	0	0	0	0	0	0	1	1	1	1	1	1	1	1	0	1	0	0	0	1	1	1	1	0	1	1	0
		87	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0

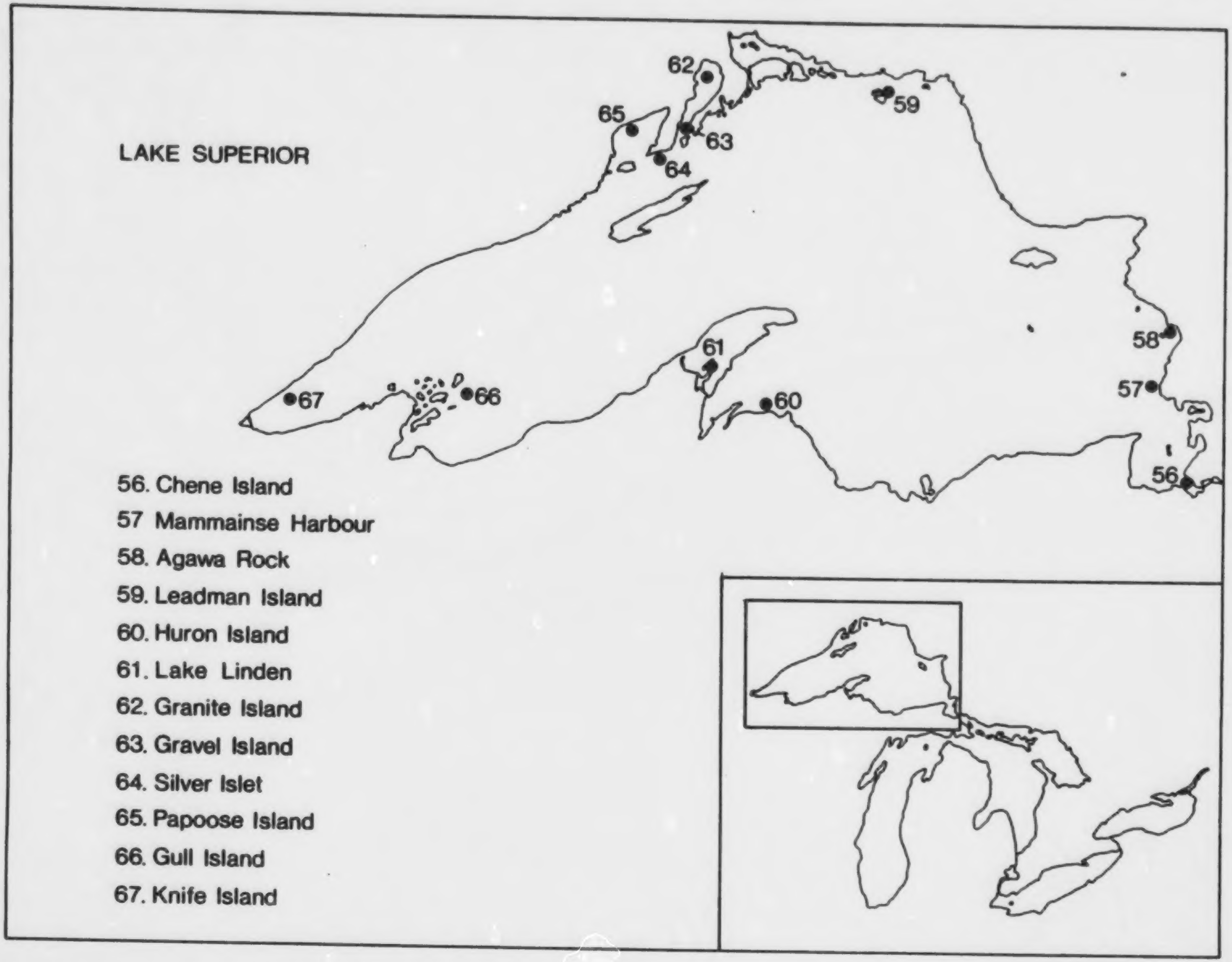

LAKE SUPERIOR
56
57
58
59
60
61
62
63
64
65
66
67
56. Chene Island
57 Mammainse Harbour
58. Agawa Rock
59. Leadman Island
60. Huron Island
61. Lake Linden
62. Granite Island
63. Gravel Island
64. Silver Islet
65. Papoose Island
66. Gull Island
67. Knife Island

Figure 10. Lake Superior colonies of fish-eating birds from which eggs were collected for contaminant analysis.

Table 10. The sample size of eggs analyzed in each year (1970–1988) from Lake Superior arranged by collection site, species sampled, and compound analyzed.

Col No.	Spec	Yr	% Lip	As	Cd	a–chl	g–chl	c–chl	124 CB	123 CB	136 CB	1234 CB	1235/ 1245 CB	PeCB	CB	DDD	DDE	DDT	DIEL	DIOXI	FURA	HEP EPX	a–hch	b–hch	g–hch	Pb	Hg	MIR	P–MIR	c–non	t–non	OCS	C 126	PCB 1254: 1260	Se
56	HERG	83	1	0	0	0	0	1	0	0	0	0	0	0	1	1	1	1	1	0	0	1	0	0	0	0	0	1	0	0	0	0	0	1	0
57	HERG	74	10	0	0	0	0	0	0	0	0	0	0	0	10	10	10	10	10	0	0	10	0	0	0	0	10	10	0	0	0	0	10	10	0
		75	10	0	0	0	0	0	0	0	0	0	0	0	10	10	10	10	10	0	0	10	0	0	0	0	10	10	0	0	0	0	10	10	0
		77	10	0	0	10	0	10	0	0	0	0	0	0	10	10	10	10	10	0	0	10	10	10	0	0	0	10	10	0	0	0	10	10	0
		78	8	0	0	5	0	8	0	0	0	0	0	0	8	8	8	8	8	0	0	8	8	8	0	0	0	8	8	0	0	0	8	8	0
58	HERG	78	10	0	0	7	0	10	0	0	0	0	0	0	10	0	10	10	10	0	0	10	0	10	0	0	0	10	10	0	0	0	10	10	0
		79	10	0	0	10	0	10	10	10	10	10	10	10	10	10	10	10	10	0	0	6	0	10	0	0	0	10	10	0	0	0	10	10	0
		80	10	0	0	9	0	10	0	0	0	10	10	10	10	10	10	10	10	0	0	10	0	10	0	0	0	10	0	0	0	0	10	10	0
		81	10	0	0	10	1	10	0	0	0	10	10	10	10	10	10	10	10	1	0	10	0	10	0	0	10	10	0	0	0	0	10	10	0
		82	10	0	0	7	10	10	0	0	0	10	10	10	10	10	10	10	10	1	0	10	0	10	0	0	10	10	0	0	10	0	10	10	0
		83	12	0	0	11	11	12	0	0	0	11	11	11	12	12	12	11	12	1	0	12	11	12	0	0	11	12	0	0	11	0	11	12	0
		84	10	0	0	10	10	10	0	0	0	10	10	10	10	10	10	10	10	1	:	10	10	10	0	0	0	10	0	0	10	0	10	10	0
		85	10	0	0	10	10	10	0	0	0	10	10	10	10	10	10	10	10	1	1	10	10	10	0	0	10	10	0	0	10	0	0	10	0
		86	1	0	0	1	0	1	0	0	0	0	0	0	1	1	1	1	1	1	1	1	0	1	1	0	0	1	1	1	1	0	1	1	0
		87	1	0	0	1	1	1	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	1	1	1	1	1	1	1	0
		88	1	0	0	1	1	1	0	0	0	1	1	1	1	1	1	1	1	0	0	1	1	1	1	0	0	1	1	1	1	1	1	1	0
59	HERG	83	1	0	0	0	0	1	0	0	0	0	0	0	1	1	1	0	1	0	0	1	0	0	0	0	0	1	0	0	0	0	0	1	0
60	HERG	83	1	0	0	0	0	1	0	0	0	0	0	0	1	1	1	0	1	0	0	1	0	0	0	0	0	1	0	0	0	0	0	1	0
61	HERG	83	1	0	0	0	1	1	0	0	0	0	0	0	1	1	1	0	1	0	0	1	0	0	0	0	0	1	0	0	0	0	0	1	0
62	HERG	73	2	0	0	0	0	0	0	0	0	0	0	0	2	2	2	2	2	0	0	2	0	0	0	0	2	0	0	0	0	0	2	0	0
		74	9	0	0	0	0	0	0	0	0	0	0	0	9	9	9	9	9	0	0	9	0	0	0	0	9	9	0	0	0	0	9	9	0
		76	10	0	0	10	0	10	0	0	0	0	0	0	10	10	10	10	10	0	0	10	0	6	0	0	10	10	0	0	0	0	10	10	0
		78	10	0	0	2	0	10	0	0	0	0	0	0	10	10	10	10	10	0	0	10	0	10	0	0	0	10	10	0	0	0	10	10	0
		79	10	0	0	10	0	10	10	10	10	10	10	10	10	10	10	10	10	0	0	10	0	10	0	0	0	10	10	0	0	0	10	10	0
		80	10	0	0	10	0	10	0	0	0	10	10	10	10	10	10	10	10	0	0	10	0	9	0	0	0	10	0	0	0	0	10	10	0
		81	10	0	0	10	8	10	0	0	0	10	10	10	10	10	10	10	10	0	0	10	0	10	0	0	10	10	0	0	0	0	10	10	0
		82	10	0	0	9	10	9	0	0	0	10	10	10	10	10	10	10	10	0	0	10	10	10	0	0	10	10	0	0	10	0	10	10	0
		84	10	0	0	10	10	10	0	0	0	10	10	10	10	10	10	10	10	1	1	10	10	10	0	0	0	10	0	0	10	0	0	10	0
		85	10	0	0	10	10	10	0	0	0	10	10	10	10	10	10	10	10	1	1	10	10	10	0	0	10	10	0	0	10	0	10	10	0
		86	10	0	0	1	0	1	0	0	0	0	0	0	1	1	1	1	1	1	1	10	0	1	0	0	0	1	1	1	1	0	1	1	0
		87	1	0	0	1	1	1	0	0	0	1	1	1	1	1	1	1	1	1	[illegible]	1	1	1	1	0	0	1	1	1	1	1	1	1	0
		88	1	0	0	1	1	1	0	0	0	1	1	1	1	1	1	1	1	0	0	1	1	1	1	0	0	1	1	1	1	1	1	1	0
63	DCCO	83	1	0	0	1	1	1	0	0	0	1	1	1	1	1	1	1	1	0	0	1	1	1	0	0	0	1	0	0	1	0	1	1	0
64	HERG	73	2	0	0	0	0	0	0	0	0	0	0	0	2	2	2	2	2	0	0	2	0	0	0	0	2	0	0	0	0	0	2	0	0
		75	10	0	0	0	0	0	0	0	0	0	0	0	10	10	10	10	10	0	0	10	0	0	0	0	10	10	0	0	0	0	10	10	0
		77	10	0	0	10	0	10	0	0	0	0	0	0	10	10	10	10	10	0	0	10	0	10	0	0	0	10	10	0	0	0	10	10	0
65	HERG	83	1	0	0	0	0	1	0	0	0	0	0	0	1	1	1	0	1	0	0	1	0	0	0	0	0	1	0	0	0	0	0	1	0
66	HERG	83	2	0	0	1	1	2	0	0	0	1	1	1	1	1	1	0	1	0	0	1	1	1	0	0	0	1	0	0	1	0	0	1	0
		86	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
67	HERG	83	1	0	0	0	0	1	0	0	0	0	0	0	1	1	1	0	1	0	0	1	0	0	0	0	0	1	0	0	0	0	0	1	0

Methodological and Statistical Notes specific to Table 11.

1. All analytical data have been calculated on a wet weight basis.

2. All means and standard deviation values are reported at four significant digits. Trailing zeros in these values are truncated.

3. Dioxin and Furan compounds are reported in pg/g. All other compounds are reported in ug/g.

4. All sample sizes reported as (N=1) in years prior to 1985 represent a sample of one egg used in chemical analysis. All sample sizes reported as (N=1) in years after 1985 represent a sample of 10 eggs which were pooled and analyzed as a single sample.

5. Analytical results for DDD and DDT which are equal to or less than twice the detection limit (i.e. 0.01 ug/g) should not be considered absolute values. Rather they are indicative of very low levels which are approaching the detection limits of these chemicals.

6. The detection limits used in the analytical determination of PCBs, chlorinated benzenes, and organochlorine pesticides varied with the laboratory and methodology used. Changes in methodology principally affected determination and quantitation of the PCBs. Detection limits have not been determined formally but generally the following can be used as a guide:

All chlorinated benzenes	0.001 ug/g
All organochlorine pesticides	0.005 ug/g
All polychlorinated biphenyls	0.01 ug/g

Detection limits for metals
(based on maximum sample weight of 1 g.):

Arsenic	0.01 ug/g
Cadmium	10 ug/g
Mercury	0.02 ug/g

(Ontario Research Foundation, 1977;1979)

The minimum detection limits for dioxin and furan compounds exist within the ranges listed below. Fluctuations in detection limits occur subject to the cleanliness of the samples at the time of analysis and the condition of the ion source of the mass spectrometer at any given time.

Tetrachlorodioxins/furans	1-2 pg/g
Pentachlorodioxins/furans	2-3 pg/g
Hexachlorodioxins/furans	3-4 pg/g
Heptachlorodioxins/furans	6 pg/g
Octachlorodioxins/furans	8-10 pg/g

7. All PCB data have been expressed as Aroclor 1254:1260 1:1 mixture or Aroclor 1260. In recent years, these values have been obtained by determination of PCB congeners #138 and #180. Earlier results have been checked against more recent results and correction factors applied where necessary.

However, the results from the Aroclor 1254:1260 1:1 mixture appear to be roughly twice that of results obtained by summing all PCB congeners (ΣPCB). Recently, factors have been obtained which convert Aroclor 1254:1260 1:1 mixture results to ΣPCB results (Turle et. al., 1991). Those factors are: 0.461 for results from Lake Ontario, 0.444 for Lake Erie, 0.484 for Lake Huron and 0.450 for Lake Superior. These factors are only applicable to Herring Gull eggs from the Great Lakes (Turle et al., 1991).

8. Organochlorine pesticide and PCB analyses were conducted under contract at the Ontario Research Foundation or ORTECH Corporation, under the direction of Dr.L.Reynolds from 1972 to 1985 (Reynolds and Cooper, 1975). From 1986, analyses have been performed by H.Won at the CWS National Wildlife Research Centre (Peakall et al., 1986).

All dioxin analyses were performed by M.Simon and M.Mulvihill of CWS National Wildlife Research Centre (Norstrom et al., 1986). These methods have been automated.

Metal analyses were performed by Ortech, Missisauga, Ontario, and Berringer-Magenta Corporation, Toronto, Ontario. Methods of analysis are described in Struger et al., 1987.

9. Methodology changes in pesticide and PCB analyses have been summarised along with quality assurance principles for results obtained by contract (Turle et. al., 1988).

10. Chlordane isomers have been presented as alpha-chlordane, trans-chlordane, and oxy-chlordane. Alpha-chlordane is synonymous with cis-chlordane, and trans-chlordane is synonymous with gamma-chlordane.

Section 1.

Index to Contaminant Data, summarized by Location.

Table 11. Contaminant Data, Summarized by Location

Index to contaminant data, summarized by Location.

LAKE ONTARIO

Colony	Species	Page
STRACHAN ISLAND	Herring Gull........................	1-9
SNAKE ISLAND	Herring Gull........................	1-12
WEST BROTHERS ISLAND	Herring Gull........................	1-17
PIGEON ISLAND	Herring Gull........................	1-19
	Double-crested Cormorant............	1-22
	Caspian Tern........................	1-23
	Black-crowned Night-Heron...........	1-24
LITTLE GALLOO ISLAND	Herring Gull	1-27
	Double-crested Cormorant............	1-30
	Black-crowned Night-Heron...........	1-31
SCOTCH BONNET ISLAND	Herring Gull........................	1-34
	Double-crested Cormorant............	1-38
GULL ISLAND PRESQU'ILE	Herring Gull........................	1-40
	Common Tern.........................	1-43
LESLIE ST. SPIT	Herring Gull........................	1-45
TORONTO ISLANDS	Common Tern.........................	1-48
MUGG'S ISLAND	Herring Gull........................	1-50
	Common Tern.........................	1-55
	Ring-billed Gull....................	1-56

Colony	Species	Page
HAMILTON HARBOUR	Herring Gull	1-59
	Common Tern	1-62
	Ring-billed Gull	1-63
NIAGARA RIVER	Herring Gull	1-66
	Black-crowned Night-Heron	1-70

LAKE ERIE/DETROIT RIVER AND ST.CLAIR RIVER

Colony	Species	Page
PORT COLBORNE CANADA FURNACE	Common Tern	1-73
PORT COLBORNE LIGHTHOUSE	Herring Gull	1-74
	Common Tern	1-79
MOHAWK ISLAND	Herring Gull	1-80
LONG POINT PROVINCIAL PARK	Forster's Tern	1-82
SANDUSKY TURNING POINT	Herring Gull	1-84
MIDDLE ISLAND	Herring Gull	1-87
	Black-crowned Night-Heron	1-92
BIG CHICKEN ISLAND	Double-crested Cormorant	1-95
MIDDLE SISTER ISLAND	Herring Gull	1-98
FIGHTING ISLAND	Herring Gull	1-100
	Common Tern	1-105
	Ring-billed Gull	1-106
WALPOLE ISLAND	Black-crowned Night-Heron	1-109
	Forster's Tern	1-111
ST.CLAIR RIVER	Herring Gull	1-113

Colony	Species	Page

LAKE HURON

Colony	Species	Page
CHANTRY ISLAND	Herring Gull	1-116
	Black-crowned Night-Heron	1-121
KETTLE POINT	Common Tern	1-123
MANITOBA REEF	Herring Gull	1-124
BLACK RIVER	Herring Gull	1-125
LITTLE CHARITY ISLAND	Herring Gull	1-126
CHANNEL SHELTER ISLAND	Herring Gull	1-127

GEORGIAN BAY

Colony	Species	Page
NOTTAWASSAGA ISLAND	Herring Gull	1-131
WALLIS ROCK	Double-crested Cormorant	1-132
SOUTH AND NORTH LIMESTONE ISLANDS	Herring Gull	1-133
	Caspian Tern	1-134
BLACKBILL ISLANDS	Double-crested Cormorant	1-137
CASTLE ROCK	Herring Gull	1-138
BUSTARD ROCK	Double-crested Cormorant	1-139
HALF MOON ISLAND	Caspian Tern	1-140

Colony	Species	Page
GULL ROCK	Double-crested Cormorant....	1-141
THE COUSINS ISLAND	Caspian Tern................	1-143
DOUCET ROCK	Double-crested Cormorant....	1-144
DOUBLE ISLAND	Herring Gull................	1-146
TALON ROCK	Double-crested Cormorant....	1-151
AFRICA ROCK	Double-crested Cormorant....	1-152
PUMPKIN POINT	Herring Gull................	1-154

LAKE MICHIGAN

Colony	Species	Page
ISLE AUX GALETS	Caspian Tern................	1-158
HAT ISLAND	Herring Gull................	1-160
	Caspian Tern................	1-161
GULL ISLAND	Herring Gull................	1-162
BELLOWS ISLAND	Herring Gull................	1-166
TROUT ISLAND	Herring Gull................	1-168
FISH ISLAND	Herring Gull................	1-171
GRAVEL ISLAND	Herring Gull................	1-174
SPIDER ISLAND	Herring Gull................	1-177

Colony	Species	Page
GRAVELLY ISLAND	Caspian Tern................	1-180
LITTLE SISTER ISLAND	Herring Gull................	1-182
BIG SISTER ISLAND	Herring Gull................	1-183
HAT ISLAND-GREEN BAY	Herring Gull................	1-192

LAKE SUPERIOR

Colony	Species	Page
CHENE ISLAND	Herring Gull................	1-194
MAMMAINSE HARBOUR	Herring Gull................	1-195
AGAWA ROCK	Herring Gull................	1-197
LEADMAN ISLANDS	Herring Gull................	1-201
HURON ISLAND	Herring Gull................	1-202
LAKE LINDEN	Herring Gull................	1-203
GRANITE ISLAND	Herring Gull................	1-204
GRAVEL ISLAND	Double-crested Cormorant....	1-205
SILVER ISLET	Herring Gull................	1-211
PAPOOSE ISLAND	Herring Gull................	1-213

Colony	Species	Page
GULL ISLAND	Herring Gull................	1-214
KNIFE ISLAND	Herring Gull................	1-218

TABLE 11. Contaminant data, summarized by Location.[*]

ST. LAWRENCE RIVER, STRACHAN ISLAND

HERRING GULL		YEAR	
		86	88
PERCENT LIPID IN EGG	N	1	1
	MEAN	7.5	9.3
	STD		
ALPHA-CHLORDANE	N	1	1
	MEAN	0.005	.0073
	STD		
GAMMA-CHLORDANE	N		1
	MEAN		.0013
	STD		
OXY-CHLORDANE	N	1	1
	MEAN	0.126	.1044
	STD		
1234-CHLOROBENZENE	N		1
	MEAN		.0175
	STD		
1235-/ 1245-CHLOROBENZENE	N		1
	MEAN		.0237
	STD		
PENTA-CHLOROBENZENE	N		1
	MEAN		.0103
	STD		
HEXA-CHLOROBENZENE	N	1	1
	MEAN	0.052	.0523
	STD		
DDD	N	1	1
	MEAN	0.008	0.003
	STD		
DDE	N	1	1
	MEAN	3.59	3.97
	STD		

---

[*] All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.[*]

ST. LAWRENCE RIVER, STRACHAN ISLAND

HERRING GULL		YEAR	
		86	88
DDT	N	1	1
	MEAN	0.04	.0255
	STD		
DIELDRIN	N	1	1
	MEAN	0.16	.1258
	STD		
2378-TETRACHLORO-DIBENZO-P-DIOXIN	N	1	1
	MEAN	57	50
	STD		
12378-PENTACHLORO-DIBENZO-P-DIOXIN	N	1	1
	MEAN	9	5
	STD		
123678-HEXACHLORO-DIBENZO-P-DIOXIN	N	1	1
	MEAN	13	9
	STD		
1234678-HEPTACHLORO-DIBENZO-P-DIOXIN	N	1	1
	MEAN	6	6
	STD		
OCTACHLORO-DIBENZO-P-DIOXIN	N	1	1
	MEAN	10	9
	STD		
2378-TETRACHLORO-DIBENZOFURAN	N	1	1
	MEAN	ND	ND
	STD		
23478-PENTACHLORO-DIBENZOFURAN	N	1	1
	MEAN	9	5
	STD		

---

[*] All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.[*]

ST. LAWRENCE RIVER, STRACHAN ISLAND

HERRING GULL		YEAR	
		86	88
123478-/ 123467- HEXACHLORO- DIBENZOFURAN	N	1	1
	MEAN	4	ND
	STD		
123678- HEXACHLORO- DIBENZOFURAN	N	1	1
	MEAN	4	ND
	STD		
HEPTACHLOR EPOXIDE	N	1	1
	MEAN	0.089	.0645
	STD		
ALPHA- HEXACHLORO- CYCLOHEXANE	N		1
	MEAN		.0026
	STD		
BETA- HEXACHLORO- CYCLOHEXANE	N	1	1
	MEAN	0.012	.0088
	STD		
GAMMA- HEXACHLORO- CYCLOHEXANE	N		1
	MEAN		.0024
	STD		
MIREX	N	1	1
	MEAN	1	.8186
	STD		
PHOTOMIREX	N	1	1
	MEAN	0.342	.3183
	STD		
CIS-NONACHLOR	N	1	1
	MEAN	0.05	0.04
	STD		

[*] All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.*

ST. LAWRENCE RIVER, STRACHAN ISLAND

HERRING GULL		YEAR	
		86	88
TRANS-NONACHLOR	N	1	1
	MEAN	0.029	.0911
	STD		
OCTACHLORO-STYRENE	N		1
	MEAN		0.026
	STD		
PCB 1260	N	1	1
	MEAN	12.4	13.04
	STD		
PCB 1254:1260 (conversion to total PCB congener conc see p. 39)	N	1	1
	MEAN	28.9	30.73
	STD		

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.*

LAKE ONTARIO, SNAKE ISLAND

HERRING GULL		YEAR											
		77	78	79	80	81	82	83	84	85	86	87	88
PERCENT LIPID IN EGG	N	10	10	10	10	10	10	11	10	10	10	1	1
	MEAN	9.64	9.68	8.55	7.88	9.51	8.35	8.064	9.12	9.19	7.48	8.9	8.8
	STD	1.508	1.571	.7649	.6125	.7666	.5126	.6918	.7361	.6624	.8417		
ARSENIC	N	10											
	MEAN	0.015											
	STD												
CADMIUM	N	10											
	MEAN	.0155											
	STD	.0332											
ALPHA-CHLORDANE	N	10		10	10	10	1	11	10	10	10	1	1
	MEAN	0.047		0.108	0.078	0.221	0.02	.0123	.0087	.0105	.0033	.0016	.0112
	STD	.0236		.0405	.0437	0.1		.0052	.0049	.0037	.0034		
GAMMA-CHLORDANE	N						10	11	10	10		1	1
	MEAN						.0095	.0034	.0085	0.003		.0016	.0013
	STD						.0016	.0013	.0078	.0011			
OXY-CHLORDANE	N	10	10	10	10	10	10	11	10	10	10	1	1
	MEAN	.2040	0.149	0.152	0.157	0.26	0.27	.2155	0.22	0.16	.1267	.1204	.1562
	STD	.1023	0.052	.0766	0.079	.1452	.1115	.0372	.0938	.0523	.0636		
123-CHLOROBENZENE	N			10									
	MEAN			0.001									
	STD			0									
124-CHLOROBENZENE	N			10									
	MEAN			.0023									
	STD			.0021									
135-CHLOROBENZENE	N			10									
	MEAN			0.001									
	STD			0									

---

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.*

LAKE ONTARIO, SNAKE ISLAND

HERRING GULL		YEAR											
		77	78	79	80	81	82	83	84	85	86	87	88
1234-CHLOROBENZENE	N			10	10	10	10	11	10	10		1	1
	MEAN			0.006	.0071	.0014	.0042	.0012	.0005	.0017		.0176	.0175
	STD			.0038	.0072	0.002	0.002	.0012	0	.0013			
1235-/ 1245-CHLOROBENZENE	N			10	10	10	10	11	10	10		1	1
	MEAN			.0063	0.005	.0005	.0045	.0015	.005	.0017		.0266	.0237
	STD			.0051	.0037	0	.0024	.0017	.0071	.0013			
PENTA-CHLOROBENZENE	N			10	10	10	10	11	10	10		1	1
	MEAN			.0218	.0161	.0215	.0172	.0069	.0126	0.008		.0097	.0103
	STD			.0081	.0071	.0076	.0034	.0014	.0046	.0045			
HEXA-CHLOROBENZENE	N	10	10	10	10	10	10	11	10	10	10	1	1
	MEAN	.5030	0.351	0.222	.1547	.2589	.1624	0.091	.1406	.0781	.0653	.0518	.0859
	STD	.1060	.1228	.1242	.0778	.1062	.0311	.0447	.0401	0.024	.0239		
DDD	N	10		10	10	10	10	11	10	10	10	1	1
	MEAN	0.270		0.112	0.078	0.173	0.245	.0245	0.015	0.021	.0005	.0035	.0078
	STD	.1168		.0399	.0305	.0775	.0701	.0129	.0115	.0057	0		
DDE	N	10	10	10	10	10	10	11	10	10	10	1	1
	MEAN	16.96	10.45	8.834	7.123	11.75	8.748	5.075	7.212	7.152	4.709	2.853	5.151
	STD	4.723	2.944	2.958	4.069	4.54	2.193	1.769	2.016	3.004	2.163		
DDT	N	10	10	10	10	10	10	11	10	10	10	1	1
	MEAN	.1130	0.069	0.057	0.143	0.105	0.099	.0255	.0175	0.036	.0336	.0122	.0382
	STD	.0622	.0208	.0298	.1371	.0488	.0273	.0069	.0151	.0143	.0251		
DIELDRIN	N	10	10	10	10	10	10	11	10	10	10	1	1
	MEAN	0.503	0.279	0.189	0.197	0.27	0.267	.2145	0.282	0.182	.1824	0.148	.1798
	STD	.0978	.0997	.0968	.0865	.1642	.0698	.1072	.2056	.0535	.1109		
2378-TETRACHLORO-DIBENZO-P-DIOXIN	N					1	1	1	1	1	1	1	1
	MEAN					185	129	90	101	67	65	80	47
	STD												

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.*

LAKE ONTARIO, SNAKE ISLAND

HERRING GULL		YEAR											
		77	78	79	80	81	82	83	84	85	86	87	88
12378-PENTACHLORO-DIBENZO-P-DIOXIN	N					1	1	1	1	1	1	1	1
	MEAN					6	11	10	14	8	10	6	7
	STD												
123678-HEXACHLORO-DIBENZO-P-DIOXIN	N					1	1	1	1	1	1	1	1
	MEAN					20	14	17	20	9	11	10	6
	STD												
1234678-HEPTACHLORO-DIBENZO-P-DIOXIN	N					1	1	1	1	1	1	1	1
	MEAN					ND	ND	ND	5	6	6	6	3
	STD												
OCTACHLORO-DIBENZO-P-DIOXIN	N					1	1	1	1	1	1	1	1
	MEAN					10	14	24	20	6	10	10	7
	STD												
2378-TETRACHLORO-DIBENZOFURAN	N								1	1	1	1	1
	MEAN								2	ND	ND	2	1
	STD												
23478-PENTACHLORO-DIBENZOFURAN	N								1	1	1	1	1
	MEAN								8	8	8	5	5
	STD												
123478-/123467-HEXACHLORO-DIBENZOFURAN	N								1	1	1	1	1
	MEAN								5	4	4	5	ND
	STD												
123678-HEXACHLORO-DIBENZOFURAN	N								1	1	1	1	1
	MEAN								5	4	4	5	ND
	STD												
HEPTACHLOR EPOXIDE	N	10	10	10	10	10	10	11	10	10	10	1	1
	MEAN	0.142	0.093	0.071	0.089	0.136	0.121	.1255	0.109	0.099	0.093	.0815	0.119
	STD	.0339	.0263	.0179	.0357	.0629	.0292	.0491	.0498	.0345	.0549		

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.*

LAKE ONTARIO, SNAKE ISLAND

HERRING GULL		YEAR											
		77	78	79	80	81	82	83	84	85	86	87	88
ALPHA-HEXACHLORO-CYCLOHEXANE	N							11	10	10		1	1
	MEAN							0.005	.0025	0.004		.0025	.0026
	STD							.0027	0	.0013			
BETA-HEXACHLORO-CYCLOHEXANE	N	10	10	10	10	10	10	11	10	10	10	1	1
	MEAN	0.238	0.097	0.065	0.038	0.065	0.043	.0336	0.035	0.015	.0114	.0031	.0132
	STD	.2557	.0189	.0288	.0187	.0321	.0164	.0136	.0097	.0053	.0072		
GAMMA-HEXACHLORO-CYCLOHEXANE	N											1	1
	MEAN											.0021	.0024
	STD												
LEAD	N	10											
	MEAN	.1598											
	STD	.1109											
TOTAL MERCURY	N					10	10	11		10			
	MEAN					0.413	0.838	.3273		0.422			
	STD					.1235	.1855	.0811		.0939			
MIREX	N	10	10	10	10	10	10	9	10	10	10	1	1
	MEAN	2.909	1.738	1.958	1.583	2.799	2.482	1.503	2.019	1.684	1.206	.8605	.9439
	STD	1.09	0.512	.6074	.7685	1.638	.4937	.5782	.6415	.6388	.4215		
PHOTOMIREX	N	10	10	10							10	1	1
	MEAN	1.06	0.705	0.731							.4537	.2595	.3991
	STD	.3716	.2777	.2418							.1403		
CIS-NONACHLOR	N										10	1	1
	MEAN										.0444	.0419	.0761
	STD										.0219		
TRANS-NONACHLOR	N						10	11	10	10	10	1	1
	MEAN						0.211	.0282	0.021	0.018	.0262	.0448	.0967
	STD						.0789	.0125	0.011	.0063	.0214		

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.*

LAKE ONTARIO, SNAKE ISLAND

HERRING GULL		YEAR											
		77	78	79	80	81	82	83	84	85	86	87	88
OCTACHLORO-STYRENE	N											1	1
	MEAN											.0166	.0336
	STD												
PCB 1260	N	10	10	10	10	10	10	11	10		10	1	1
	MEAN	101.6	55.24	57.98	46.45	76.59	52.31	38.18	45.44		13.18	7.396	11.18
	STD	28.98	18.09	16	20.65	38.35	8.667	14.9	13.49		4.244		
PCB 1254:1260 (conversion to total PCB congener conc see pg. 39)	N	10	10	10	10	10	10	11	10	10	10	1	1
	MEAN	118.4	70.68	62.9	53.49	85.62	61.48	46.18	53.34	34.59	29.45	17.34	26.67
	STD	33.06	20.46	17.78	23.62	40.65	12.1	18.11	15.67	14.9	9.249		
SELENIUM	N	10											
	MEAN	0.67											
	STD	.2111											

---

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.*

LAKE ONTARIO, WEST BROTHERS ISLAND

HERRING GULL		YEAR		
		73	74	75
PERCENT LIPID IN EGG	N	16	10	10
	MEAN	9.931	7.21	7.81
	STD	4.072	1.423	1.737
HEXA-CHLOROBENZENE	N	16	10	10
	MEAN	1.154	.5567	.2166
	STD	.9391	.3883	.2029
DDD	N	16	10	10
	MEAN	1.026	0.308	.0763
	STD	.6358	.3044	.0321
DDE	N	16	10	10
	MEAN	41.98	21.37	23.58
	STD	27.44	9.148	6.094
DDT	N	16	10	10
	MEAN	.7789	.9993	.2394
	STD	.8406	1.058	.1681
DIELDRIN	N	16	10	10
	MEAN	.4075	0.471	0.347
	STD	.2237	.2492	.1962
HEPTACHLOR EPOXIDE	N	16	10	10
	MEAN	.0956	0.171	0.142
	STD	.0722	.0941	.0394
BETA-HEXACHLORO-CYCLOHEXANE	N	16		
	MEAN	.0925		
	STD	.0586		
TOTAL MERCURY	N	16	10	10
	MEAN	.4844	0.458	0.657
	STD	.2001	.1838	.2614

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.[*]

LAKE ONTARIO, WEST BROTHERS ISLAND

HERRING GULL		YEAR		
		73	74	75
MIREX	N		10	10
	MEAN		6.59	5.97
	STD		2.804	2.275
PCB 1260	N	16	10	10
	MEAN	114.4	106.4	140.4
	STD	82.9	37	40.32
PCB 1254:1260 (conversion to total PCB congener conc see pg. 39)	N	16	10	10
	MEAN	132.8	140.5	179.6
	STD	96.6	48.84	51.15

---

[*] All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.[*]

LAKE ONTARIO, PIGEON ISLAND

HERRING GULL		YEAR		
		72	81	82
PERCENT LIPID IN EGG	N	1	10	10
	MEAN	5.4	8.72	8.14
	STD		.5712	.9778
ALPHA-CHLORDANE	N		10	8
	MEAN		0.272	.0262
	STD		.1209	.0074
GAMMA-CHLORDANE	N		2	10
	MEAN		0.12	0.011
	STD		.0283	.0032
OXY-CHLORDANE	N		10	10
	MEAN		0.222	0.309
	STD		.0694	.1212
1234-CHLOROBENZENE	N		10	10
	MEAN		0.005	.0051
	STD		.0035	.0025
1235-/ 1245-CHLOROBENZENE	N		10	10
	MEAN		0.003	.0042
	STD		0.004	0.002
PENTA-CHLOROBENZENE	N		10	10
	MEAN		.0226	.0187
	STD		.0087	.0029
HEXA-CHLOROBENZENE	N	1	10	10
	MEAN	0.779	.2665	.1779
	STD		.1151	.0335
DDD	N	1	10	10
	MEAN	.0007	0.104	0.213
	STD		.0357	.0946

[*] All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.[*]

LAKE ONTARIO, PIGEON ISLAND

HERRING GULL		YEAR		
		72	81	82
DDE	N	1	10	10
	MEAN	35.6	13.98	10.43
	STD		8.456	2.887
DDT	N	1	10	10
	MEAN	0.002	0.076	0.163
	STD		0.031	0.062
DIELDRIN	N	1	10	10
	MEAN	0.75	0.349	0.335
	STD		.1031	.0851
HEPTACHLOR EPOXIDE	N	1	8	10
	MEAN	0.5	.1438	0.118
	STD		.0463	.0204
BETA-HEXACHLORO-CYCLOHEXANE	N		10	10
	MEAN		0.065	0.036
	STD		.0217	.0107
TOTAL MERCURY	N	1	10	10
	MEAN	0.81	0.51	0.877
	STD		.1697	.2474
MIREX	N		10	10
	MEAN		2.837	3.064
	STD		1.465	.7888
TRANS-NONACHLOR	N			10
	MEAN			0.153
	STD			.0576

---

[*] All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.[*]

LAKE ONTARIO, PIGEON ISLAND

HERRING GULL		YEAR		
		72	81	82
PCB 1260	N	1	10	10
	MEAN	151	74.72	55.1
	STD		24.42	18.7
PCB 1254:1260 (conversion to total PCB congener conc see pg. 39)	N		10	10
	MEAN		83.5	61.56
	STD		27.07	21.37

[*] All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.[*]

LAKE ONTARIO, PIGEON ISLAND

DOUBLE-CRESTED CORMORANT		YEAR
		81
PERCENT LIPID IN EGG	N	10
	MEAN	4.24
	STD	.3239
1234-CHLOROBENZENE	N	10
	MEAN	.0005
	STD	0
1235-/ 1245-CHLOROBENZENE	N	10
	MEAN	.0005
	STD	0
PENTA-CHLOROBENZENE	N	10
	MEAN	.0026
	STD	.0025
HEXA-CHLOROBENZENE	N	10
	MEAN	.0421
	STD	.0196
DDE	N	10
	MEAN	3.745
	STD	2.36
PCB 1260	N	10
	MEAN	17.84
	STD	7.367
PCB 1254:1260 (conversion to total PCB congener conc see pg. 39)	N	10
	MEAN	20.65
	STD	8.109

---

[*] All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.[*]

LAKE ONTARIO, PIGEON ISLAND

CASPIAN TERN		YEAR
		81
PERCENT LIPID IN EGG	N	8
	MEAN	8.3
	STD	1.243
1234-CHLOROBENZENE	N	8
	MEAN	.0009
	STD	.0012
1235-/ 1245-CHLOROBENZENE	N	8
	MEAN	.0005
	STD	0
PENTA-CHLOROBENZENE	N	8
	MEAN	.0044
	STD	0.003
HEXA-CHLOROBENZENE	N	8
	MEAN	.0638
	STD	.0449
DDE	N	8
	MEAN	5.229
	STD	1.601
MIREX	N	8
	MEAN	1.571
	STD	.5303
PCB 1260	N	8
	MEAN	31.64
	STD	14.05
PCB 1254:1260 (conversion to total PCB congener conc see pg. 39)	N	8
	MEAN	39.28
	STD	17.77

---

[*] All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.[*]

LAKE ONTARIO, PIGEON ISLAND

BLACK-CROWNED NIGHT-HERON		YEAR	
		72	82
PERCENT LIPID IN EGG	N	1	12
	MEAN	9.6	5.983
	STD		1.213
ALPHA-CHLORDANE	N		11
	MEAN		.0214
	STD		.0158
GAMMA-CHLORDANE	N		12
	MEAN		.0075
	STD		.0032
OXY-CHLORDANE	N		12
	MEAN		.1658
	STD		.1384
1234-CHLOROBENZENE	N		12
	MEAN		.0005
	STD		.0008
1235-/ 1245-CHLOROBENZENE	N		12
	MEAN		.0003
	STD		0
PENTA-CHLOROBENZENE	N		12
	MEAN		.0009
	STD		.0014
HEXA-CHLOROBENZENE	N	1	12
	MEAN	0.09	.0416
	STD		.0234
DDD	N	1	12
	MEAN	0.08	0.11
	STD		0.136

[*] All units measured on wet **weight** basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.*

LAKE ONTARIO, PIGEON ISLAND

BLACK-CROWNED NIGHT-HERON		YEAR	
		72	82
DDE	N	1	12
	MEAN	13	4.827
	STD		2.327
DDT	N	1	12
	MEAN	.0112	.0675
	STD		.0538
DIELDRIN	N	1	12
	MEAN	0.28	.2833
	STD		.4945
HEPTACHLOR EPOXIDE	N	1	12
	MEAN	.0005	.0475
	STD		.0214
ALPHA-HEXACHLORO-CYCLOHEXANE	N		12
	MEAN		.0025
	STD		0
BETA-HEXACHLORO-CYCLOHEXANE	N		12
	MEAN		.0327
	STD		.0235
TOTAL MERCURY	N	1	
	MEAN	0.12	
	STD		
MIREX	N		12
	MEAN		1.035
	STD		.6836
TRANS-NONACHLOR	N		12
	MEAN		.1025
	STD		.0586

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.[*]

LAKE ONTARIO, PIGEON ISLAND

BLACK-CROWNED NIGHT-HERON		YEAR	
		72	82
PCB 1260	N	1	12
	MEAN	55.1	21.99
	STD		10.68
PCB 1254:1260 (conversion to total PCB congener conc see pg. 39)	N		12
	MEAN		24.39
	STD		11.77

[*] All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.[*]

LAKE ONTARIO, LITTLE GALLOO ISLAND

HERRING GULL		YEAR	
		81	82
PERCENT LIPID IN EGG	N	10	10
	MEAN	9.2	8.68
	STD	1.134	.7714
ALPHA-CHLORDANE	N	10	10
	MEAN	0.201	0.021
	STD	.0538	.0057
GAMMA-CHLORDANE	N	9	10
	MEAN	.0005	.0095
	STD	0	.0016
OXY-CHLORDANE	N	10	10
	MEAN	0.202	0.286
	STD	.0725	0.186
1234-CHLOROBENZENE	N	10	10
	MEAN	.0091	.0061
	STD	.0012	.0022
1235-/ 1245-CHLOROBENZENE	N	10	10
	MEAN	.0073	.0069
	STD	0.004	.0028
PENTA-CHLOROBENZENE	N	10	10
	MEAN	.0253	.0199
	STD	.0084	.0055
HEXA-CHLOROBENZENE	N	10	10
	MEAN	.2366	.1035
	STD	.0826	.0148
DDD	N	10	10
	MEAN	0.109	0.469
	STD	.0321	.0832

---

[*] All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.[*]

LAKE ONTARIO, LITTLE GALLOO ISLAND

HERRING GULL		YEAR	
		81	82
DDE	N	10	10
	MEAN	8.437	8.27
	STD	3.076	3.717
DDT	N	10	10
	MEAN	0.076	0.09
	STD	.0276	0.035
DIELDRIN	N	10	10
	MEAN	0.317	0.36
	STD	.1151	.2609
HEPTACHLOR EPOXIDE	N	10	10
	MEAN	0.123	0.105
	STD	.0419	.0513
ALPHA-HEXACHLORO-CYCLOHEXANE	N		10
	MEAN		0.005
	STD		0.002
BETA-HEXACHLORO-CYCLOHEXANE	N	10	10
	MEAN	0.058	0.04
	STD	.0204	.0115
TOTAL MERCURY	N	10	10
	MEAN	0.468	0.801
	STD	.1698	.1419
MIREX	N	10	10
	MEAN	2.246	3.461
	STD	.8507	1.545
TRANS-NONACHLOR	N		10
	MEAN		0.551
	STD		.2779

[*] All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.[*]

LAKE ONTARIO, LITTLE GALLOO ISLAND

HERRING GULL		YEAR	
		81	82
PCB 1260	N	10	10
	MEAN	59.34	44.22
	STD	20.32	21.21
PCB 1254:1260 (conversion to total PCB congener conc see pg. 39)	N	10	10
	MEAN	67.13	53.88
	STD	22.76	24.86

---

[*] All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.[*]

LAKE ONTARIO, LITTLE GALLOO ISLAND

DOUBLE-CRESTED CORMORANT		YEAR
		81
PERCENT LIPID IN EGG	N	10
	MEAN	4.23
	STD	.5813
1234-CHLOROBENZENE	N	10
	MEAN	.0039
	STD	.0106
1235-/ 1245-CHLOROBENZENE	N	10
	MEAN	0.006
	STD	.0172
PENTA-CHLOROBENZENE	N	10
	MEAN	.0625
	STD	.1822
HEXA-CHLOROBENZENE	N	10
	MEAN	.1517
	STD	.3021
DDE	N	10
	MEAN	5.8
	STD	1.739
MIREX	N	10
	MEAN	1.237
	STD	0.572
PCB 1260	N	10
	MEAN	33.08
	STD	12.93
PCB 1254:1260 (conversion to total PCB congener conc see pg. 39)	N	10
	MEAN	37.87
	STD	14.66

[*] All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.[*]

LAKE ONTARIO, LITTLE GALLOO ISLAND

BLACK-CROWNED NIGHT-HERON		YEAR
		82
PERCENT LIPID IN EGG	N	1
	MEAN	5.1
	STD	
ALPHA-CHLORDANE	N	1
	MEAN	0.02
	STD	
GAMMA-CHLORDANE	N	1
	MEAN	0.005
	STD	
OXY-CHLORDANE	N	1
	MEAN	0.11
	STD	
1234-CHLOROBENZENE	N	1
	MEAN	.0003
	STD	
1235-/ 1245-CHLOROBENZENE	N	1
	MEAN	.0003
	STD	
PENTA-CHLOROBENZENE	N	1
	MEAN	0.004
	STD	
HEXA-CHLOROBENZENE	N	1
	MEAN	0.046
	STD	
DDD	N	1
	MEAN	0.04
	STD	

[*] All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.[a]

LAKE ONTARIO, LITTLE GALLOO ISLAND

BLACK-CROWNED NIGHT-HERON		YEAR
		82
DDE	N	1
	MEAN	4.08
	STD	
DDT	N	1
	MEAN	0.05
	STD	
DIELDRIN	N	1
	MEAN	0.24
	STD	
HEPTACHLOR EPOXIDE	N	1
	MEAN	0.04
	STD	
ALPHA-HEXACHLOROCYCLOHEXANE	N	1
	MEAN	.0025
	STD	
BETA-HEXACHLOROCYCLOHEXANE	N	1
	MEAN	0.01
	STD	
MIREX	N	1
	MEAN	0.84
	STD	
TRANS-NONACHLOR	N	1
	MEAN	0.06
	STD	
PCB 1260	N	1
	MEAN	17.8
	STD	

---

[a] All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.[*]

LAKE ONTARIO, LITTLE GALLOO ISLAND

BLACK-CROWNED NIGHT-HERON		YEAR
		82
PCB 1254:1260 (conversion to total PCB congener conc see pg. 39)	N	1
	MEAN	18.9
	STD	

[*] All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.[*]

LAKE ONTARIO, SCOTCH BONNET ISLAND

HERRING GULL		YEAR									
		71	72	74	76	77	78	79	80	81	82
PERCENT LIPID IN EGG	N	1	1	1	15	1	8	1	1	1	1
	MEAN	8.4	8.7	7.3	9.487	7.7	9.588	7.0	7.8	7.1	8.1
	STD				.8983		.5842				
ALPHA-CHLORDANE	N				15		8				1
	MEAN				.1533		0.205				0.02
	STD				.1236		.0657				
GAMMA-CHLORDANE	N										1
	MEAN										0.01
	STD										
OXY-CHLORDANE	N				15		8				1
	MEAN				.2399		.4238				0.58
	STD				.1896		.2075				
1234-CHLOROBENZENE	N										1
	MEAN										0.005
	STD										
1235-/ 1245-CHLOROBENZENE	N										1
	MEAN										0.006
	STD										
PENTA-CHLOROBENZENE	N										1
	MEAN										0.023
	STD										
HEXA-CHLOROBENZENE	N				15		8				1
	MEAN				.6743		.4825				0.214
	STD				.5243		.1726				
DDD	N				15		8				1
	MEAN				.1915		.2175				0.15
	STD				.0891		.0515				

[*] All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.*

LAKE ONTARIO, SCOTCH BONNET ISLAND

HERRING GULL		YEAR									
		71	72	74	76	77	78	79	80	81	82
DDE	N				15		8				1
	MEAN				25.31		18.4				10.4
	STD				13.81		8.47				
DDT	N				15		8				1
	MEAN				0.639		0.275				0.18
	STD				.5097		.0526				
DIELDRIN	N				15		8				1
	MEAN				0.37		.3525				0.53
	STD				.1509		0.134				
2378-TETRACHLORO-DIBENZO-P-DIOXIN	N	1	1	1	1	1	1	1	1	1	1
	MEAN	1996	2347	923	489	518	261	169	170	229	204
	STD										
12378-PENTACHLORO-DIBENZO-P-DIOXIN	N	1	1	1	1	1	1	1	1	1	1
	MEAN	58	65	24	19	22	10	7	10	9	15
	STD										
123678-HEXACHLORO-DIBENZO-P-DIOXIN	N	1	1	1	1	1	1	1	1	1	1
	MEAN	47	45	31	28	30	25	18	19	22	49
	STD										
1234678-HEPTACHLORO-DIBENZO-P-DIOXIN	N	1	1	1	1	1	1	1	1	1	1
	MEAN	8	8	ND	9	8	8	8	ND	8	ND
	STD										
OCTACHLORO-DIBENZO-P-DIOXIN	N	1	1	1	1	1	1	1	1	1	1
	MEAN	22	22	10	115	12	13	33	16	18	10
	STD										
2378-TETRACHLORO-DIBENZOFURAN	N	1	1	1	1	1	1	1	1	1	1
	MEAN	5	6	3	2	3	ND	2	2	2	ND
	STD										

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.[*]

LAKE ONTARIO, SCOTCH BONNET ISLAND

HERRING GULL		YEAR									
		71	72	74	76	77	78	79	80	81	82
23478-PENTACHLORO-DIBENZOFURAN	N	1	1	1	1	1	1	1	1	1	1
	MEAN	70	77	25	16	22	11	7	8	8	12
	STD										
123478-/ 123467-HEXACHLORO-DIBENZOFURAN	N	1	1	1	1	1	1	1	1	1	1
	MEAN	28	38	16	9	19	7	8	7	10	8
	STD										
123678-HEXACHLORO-DIBENZOFURAN	N	1	1	1	1	1	1	1	1	1	1
	MEAN	20	28	13	9	14	6	7	7	10	8
	STD										
HEPTACHLOR EPOXIDE	N				15		8				1
	MEAN				0.144		0.17				0.16
	STD				.0623		.0421				
ALPHA-HEXACHLORO-CYCLOHEXANE	N										1
	MEAN										.0025
	STD										
BETA-HEXACHLORO-CYCLOHEXANE	N				14		8				1
	MEAN				.0979		.1237				0.09
	STD				.0618		.0245				
TOTAL MERCURY	N				5						1
	MEAN				0.358						0.72
	STD				.1173						
MIREX	N				15		8				1
	MEAN				3.864		3.389				3.67
	STD				3.28		2.372				
PHOTOMIREX	N				10		8				
	MEAN				2.014		1.229				
	STD				.7225		.8114				

---

[*] All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.*

LAKE ONTARIO, SCOTCH BONNET ISLAND

HERRING GULL		YEAR									
		71	72	74	76	77	78	79	80	81	82
TRANS-NONACHLOR	N										1
	MEAN										0.08
	STD										
PCB 1260	N				15		8				1
	MEAN				139.1		104.2				102
	STD				89.37		53.33				
PCB 1254:1260 (conversion to total PCB congener conc see pg. 39)	N				15		8				1
	MEAN				165.1		122.6				117
	STD				104.7		63.22				

---

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.[a]

LAKE ONTARIO, SCOTCH BONNET ISLAND

DOUBLE-CRESTED CORMORANT		YEAR	
		72	75
PERCENT LIPID IN EGG	N	7	1
	MEAN	3.457	0.6
	STD	1.29	
HEXA-CHLOROBENZENE	N	7	1
	MEAN	.1543	0.005
	STD	.0637	
DDD	N	7	1
	MEAN	.1786	0.01
	STD	0.062	
DDE	N	7	1
	MEAN	9.37	0.55
	STD	2.187	
DDT	N	7	1
	MEAN	.2747	.0223
	STD	.1852	
DIELDRIN	N	7	1
	MEAN	.2686	0.02
	STD	.1567	
HEPTACHLOR EPOXIDE	N	7	1
	MEAN	.0357	0.005
	STD	.0079	
TOTAL MERCURY	N	7	1
	MEAN	0.94	0.53
	STD	.2454	
PCB 1260	N	7	1
	MEAN	18.3	2.1
	STD	8.11	

[a] All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.[*]

LAKE ONTARIO, SCOTCH BONNET ISLAND

DOUBLE-CRESTED CORMORANT		YEAR	
		72	75
PCB 1254:1260 (conversion to total PCB congener conc see pg. 39)	N		1
	MEAN		2.4
	STD		

---

[*] All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.[*]

LAKE ONTARIO, GULL ISLAND, PRESQU'ILE PROVINCIAL PARK

HERRING GULL		YEAR				
		76	77	78	80	82
PERCENT LIPID IN EGG	N	5	4	19	11	10
	MEAN	8.68	7.975	9.484	9.218	8.73
	STD	.4324	1.533	.9957	1.173	1.332
ALPHA-CHLORDANE	N	5	4	19	11	10
	MEAN	.0082	0.2	.2158	.0155	0.017
	STD	.0081	0.092	.1029	.0069	.0067
GAMMA-CHLORDANE	N				11	10
	MEAN				.0218	0.012
	STD				0.006	.0042
OXY-CHLORDANE	N	5	4	19	11	10
	MEAN	.0364	.1583	.3584	.2927	0.428
	STD	.0418	.0266	.1982	.1239	0.151
1234-CHLOROBENZENE	N					10
	MEAN					.0029
	STD					.0034
1235-/ 1245-CHLOROBENZENE	N					10
	MEAN					.0005
	STD					
PENTA-CHLOROBENZENE	N					10
	MEAN					.0187
	STD					.0108
HEXA-CHLOROBENZENE	N	5	4	19	11	10
	MEAN	.0046	.3171	.4516	.1964	0.168
	STD	0.008	.0959	.2108	.0768	.1101
DDD	N	5	4	19	11	9
	MEAN	0.084	.1786	.2321	.0173	.0733
	STD	.0198	.0598	0.087	.0047	0.025

---

[*] All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.[*]

LAKE ONTARIO, GULL ISLAND, PRESQU'ILE PROVINCIAL PARK

HERRING GULL		YEAR				
		76	77	78	80	82
DDE	N	5	4	19	11	10
	MEAN	21.5	20.18	19.12	7.345	12.28
	STD	14.67	6.105	9.043	2.245	4.509
DDT	N	5	4	19	11	10
	MEAN	.1296	.1868	.2895	.1182	0.118
	STD	.0825	.0553	.1231	.0424	.0718
DIELDRIN	N	5	4	19	11	10
	MEAN	0.216	0.445	.4237	.3382	0.314
	STD	.1242	.1196	.2572	.3557	.1141
HEPTACHLOR EPOXIDE	N	5	4	19	11	10
	MEAN	0.064	0.19	.2037	.2127	0.126
	STD	.0195	.0523	.0826	.0976	.0546
ALPHA-HEXACHLORO-CYCLOHEXANE	N				11	
	MEAN				0.005	
	STD				0	
BETA-HEXACHLORO-CYCLOHEXANE	N	4	4	19	11	10
	MEAN	0.02	0.135	.1205	.0536	.0431
	STD	.0082	.0569	.0635	.0112	.0382
GAMMA-HEXACHLORO-CYCLOHEXANE	N				11	
	MEAN				.0005	
	STD				0	
LEAD	N				1	
	MEAN				0.04	
	STD					
TOTAL MERCURY	N	5			1	10
	MEAN	0.368			0.31	0.581
	STD	.1213				.2297

[*] All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.[*]

LAKE ONTARIO, GULL ISLAND, PRESQU'ILE PROVINCIAL PARK

HERRING GULL		YEAR				
		76	77	78	80	82
MIREX	N	5	4	19	11	10
	MEAN	.0005	3.625	4.226	2.005	2.782
	STD	0	.9307	2.846	.6724	1.391
PHOTOMIREX	N		4	19	11	
	MEAN		1.223	1.626	.6791	
	STD		.3717	.9958	.3122	
TRANS-NONACHLOR	N					10
	MEAN					0.068
	STD					.0308
PCB 1260	N	5	4	19	11	10
	MEAN	121.9	96.55	100.2	52.51	60.46
	STD	40.41	27.29	55.95	12.27	19.79
PCB 1254:1260 (conversion to total PCB congener conc see pg. 39)	N	5	4	19	11	10
	MEAN	148.5	116.1	121.5	61.86	70.8
	STD	51.43	35.53	70.92	14.45	22.7

---

[*] All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.[*]

LAKE ONTARIO, GULL ISLAND, PRESQU'ILE PROVINCIAL PARK

COMMON TERN		YEAR 75
PERCENT LIPID IN EGG	N	4
	MEAN	7.6
	STD	.9557
HEXA-CHLOROBENZENE	N	4
	MEAN	.1375
	STD	.0866
DDD	N	4
	MEAN	.0538
	STD	.0439
DDE	N	4
	MEAN	2.978
	STD	1.774
DDT	N	4
	MEAN	.0447
	STD	.0182
DIELDRIN	N	4
	MEAN	0.5
	STD	.2617
HEPTACHLOR EPOXIDE	N	4
	MEAN	.0625
	STD	.0525
TOTAL MERCURY	N	4
	MEAN	0.295
	STD	0.09
PCB 1260	N	4
	MEAN	25.5
	STD	7.625

---

[*] All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.[a]

LAKE ONTARIO, GULL ISLAND, PRESQU'ILE PROVINCIAL PARK

COMMON TERN		YEAR 75
PCB 1254:1260 (conversion to total PCB congener conc see pg. 39)	N	4
	MEAN	30.38
	STD	7.02

[a] All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.*

LAKE ONTARIO, LESLIE ST. SPIT

HERRING GULL		YEAR	
		78	88
PERCENT LIPID IN EGG	N	4	1
	MEAN	8.7	8.6
	STD	1.51	
ALPHA-CHLORDANE	N	3	1
	MEAN	.1433	.0145
	STD	.0473	
GAMMA-CHLORDANE	N		1
	MEAN		.0013
	STD		
OXY-CHLORDANE	N	4	1
	MEAN	.1975	.1391
	STD	.1024	
1234-CHLOROBENZENE	N		1
	MEAN		.0175
	STD		
1235-/ 1245-CHLOROBENZENE	N		1
	MEAN		.0237
	STD		
PENTA-CHLOROBENZENE	N		1
	MEAN		.0103
	STD		
HEXA-CHLOROBENZENE	N	4	1
	MEAN	.2975	.0527
	STD	0.09	
DDD	N		1
	MEAN		.0137
	STD		

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.*

LAKE ONTARIO, LESLIE ST. SPIT

HERRING GULL		YEAR	
		78	88
DDE	N	4	1
	MEAN	9.96	3.343
	STD	3.89	
DDT	N	4	1
	MEAN	0.09	.0383
	STD	.0583	
DIELDRIN	N	4	1
	MEAN	0.275	.1205
	STD	.0265	
2378-TETRACHLORO-DIBENZO-P-DIOXIN	N		1
	MEAN		40
	STD		
12378-PENTACHLORO-DIBENZO-P-DIOXIN	N		1
	MEAN		7
	STD		
123678-HEXACHLORO-DIBENZO-P-DIOXIN	N		1
	MEAN		15
	STD		
1234678-HEPTACHLORO-DIBENZO-P-DIOXIN	N		1
	MEAN		8
	STD		
OCTACHLORO-DIBENZO-P-DIOXIN	N		1
	MEAN		11
	STD		
2378-TETRACHLORO-DIBENZOFURAN	N		1
	MEAN		ND
	STD		

---

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.[*]

LAKE ONTARIO, LESLIE ST. SPIT

HERRING GULL		YEAR	
		78	88
23478-PENTACHLORO-DIBENZOFURAN	N		1
	MEAN		5
	STD		
123478-/123467-HEXACHLORO-DIBENZOFURAN	N		1
	MEAN		3
	STD		
123678-HEXACHLORO-DIBENZOFURAN	N		1
	MEAN		4
	STD		
HEPTACHLOR EPOXIDE	N	4	1
	MEAN	.1125	.0667
	STD	.0126	
ALPHA-HEXACHLORO-CYCLOHEXANE	N		1
	MEAN		.0026
	STD		
BETA-HEXACHLORO-CYCLOHEXANE	N	4	1
	MEAN	0.05	.0092
	STD	.0183	
GAMMA-HEXACHLORO-CYCLOHEXANE	N		1
	MEAN		.0024
	STD		
MIREX	N	4	1
	MEAN	1.238	.6921
	STD	.8599	
PHOTOMIREX	N	4	1
	MEAN	0.425	.2927
	STD	.2567	

[*] All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.[*]

LAKE ONTARIO, LESLIE ST. SPIT

HERRING GULL		YEAR	
		78	88
CIS-NONACHLOR	N		1
	MEAN		.0491
	STD		
TRANS-NONACHLOR	N		1
	MEAN		.0678
	STD		
OCTACHLORO-STYRENE	N		1
	MEAN		.0168
	STD		
PCB 1260	N	4	1
	MEAN	61.87	9.411
	STD	13.32	
PCB 1254:1260 (conversion to total PCB congener conc see pg. 39)	N	4	1
	MEAN	72.27	20.39
	STD	21.44	

[*] All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.[*]

LAKE ONTARIO, TORONTO ISLANDS

COMMON TERN		YEAR
		73
PERCENT LIPID IN EGG	N	6
	MEAN	5.917
	STD	.8377
HEXA-CHLOROBENZENE	N	6
	MEAN	.1467
	STD	.0954
DDD	N	6
	MEAN	.1717
	STD	.1001
DDE	N	6
	MEAN	5.733
	STD	2.985
DDT	N	6
	MEAN	.2794
	STD	.1460
DIELDRIN	N	6
	MEAN	0.34
	STD	.2211
HEPTACHLOR EPOXIDE	N	6
	MEAN	.0583
	STD	.0564
TOTAL MERCURY	N	6
	MEAN	.5617
	STD	.1579
PCB 1260	N	6
	MEAN	22.85
	STD	13.11

[*] All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.'

LAKE ONTARIO, MUGG'S ISLAND

HERRING GULL		YEAR												
		74	75	77	78	79	80	81	82	83	84	85	86	87
PERCENT LIPID IN EGG	N	9	10	10	4	10	9	10	9	11	10	10	10	1
	MEAN	7.789	7.69	8.79	8.575	8.73	7.856	8.93	8.656	8.491	8.89	9.14	8.1	9
	STD	1.214	.7767	1.039	.4193	.5458	.7955	.7846	1.577	.7286	.8491	.6867	1.182	
ARSENIC	N			10										
	MEAN			.0213										
	STD			.0133										
CADMIUM	N			10										
	MEAN			.0057										
	STD			.0022										
ALPHA-CHLORDANE	N			9	2	8	9	10	9	11	10	10	10	1
	MEAN			.0289	0.125	.1238	.1044	0.193	.0189	.0114	.0135	0.017	.0113	0.006
	STD			.0078	.0495	0.035	.0413	0.057	.0136	.0045	0.01	.0125	.0055	
GAMMA-CHLORDANE	N								9	11	10	10		1
	MEAN								.0094	.0027	.0055	0.004		.0016
	STD								.0017	.0008	.0016	.0013		
OXY-CHLORDANE	N			9	4	8	9	10	9	11	10	10	10	1
	MEAN			.1578	.2025	0.255	.2467	0.272	.3622	0.17	0.2	0.169	.1513	0.114
	STD			.0632	.0754	.1732	.1697	.2347	.1431	.0522	.0688	.0582	.0325	
123-CHLOROBENZENE	N					10								
	MEAN					0.001								
	STD					0								
124-CHLOROBENZENE	N					10								
	MEAN					.0037								
	STD					.0028								
135-CHLOROBENZENE	N					10								
	MEAN					0.001								
	STD					0								

'All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.[1]

LAKE ONTARIO, MUGG'S ISLAND

HERRING GULL		YEAR												
		74	75	77	78	79	80	81	82	83	84	85	86	87
1234-CHLOROBENZENE	N					10	9	10	9	11	10	10		1
	MEAN					.0082	.0068	0.009	.0039	.0033	.0033	.0005		.0176
	STD					0.003	.0037	0.009	.0034	.0024	0.002	.0005		
1235-/ 1245-CHLOROBENZENE	N					10	9	10	9	11	10	10		1
	MEAN					.0095	0.006	.0081	.0038	.0038	.0026	.0003		0.026
	STD					.0029	.0037	.0076	.0033	.0028	.0015	0		
PENTA-CHLOROBENZENE	N					10	9	10	9	11	10	10		1
	MEAN					.0499	.0307	.0391	.0242	.0132	.0137	.0118		.0094
	STD					.0681	.0242	.0266	.0099	.0084	.0082	0.016		
HEXA-CHLOROBENZENE	N	9	10	10	4	10	9	10	9	11	10	10	10	1
	MEAN	.6038	.4484	.3430	.2675	0.206	.1974	.2305	.1551	.0729	0.106	.0582	.0682	.0332
	STD	.3559	.2642	.0636	0.033	.0752	0.097	.0839	.0541	.0421	.0458	.0297	.0196	
DDD	N	9	10	10		10	9	10	9	11	10	10	10	1
	MEAN	.3064	0.007	0.165		0.118	0.14	0.056	.1011	.0182	.0175	0.033	.0159	.0117
	STD	.1106	0	0.058		.0644	.0673	.0246	.0392	.0087	.0127	.0157	.0088	
DDE	N	9	10	10	4	10	9	10	9	11	10	10	10	1
	MEAN	23.32	22.02	12.8	11.85	9.046	8.169	10.26	11.47	4.489	5.317	4.897	3.999	2.348
	STD	5.521	5.554	2.53	1.748	3.468	5.822	5.164	4.399	1.613	2.277	1.333	1.045	
DDT	N	9	10	10	4	10	9	10	9	11	10	10	10	1
	MEAN	1.182	.1292	0.118	.1025	0.079	.1044	0.078	.1067	.0168	.0095	0.047	.0489	.0202
	STD	.7866	.0572	.0459	.0377	.0574	.0442	0.027	.0218	.0072	.0044	.0216	.0161	
DIELDRIN	N	9	10	10	4	10	9	10	9	11	10	10	10	1
	MEAN	.4589	0.241	0.276	.2175	0.221	.1789	0.28	.2922	.1436	0.132	0.125	.1352	.1147
	STD	.1267	.1652	.0786	.0618	.1322	.1025	0.209	.2096	0.101	0.052	.0321	.0426	
2378-TETRACHLORO-DIBENZO-P-DIOXIN	N										1	1	1	1
	MEAN										60	39	49	45
	STD													

---

[1] All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.[*]

LAKE ONTARIO, MUGG'S ISLAND

HERRING GULL		YEAR												
		74	75	77	78	79	80	81	82	83	84	85	86	87
12378-PENTACHLORODIBENZO-P-DIOXIN	N										1	1	1	1
	MEAN										10	5	11	5
	STD													
123678-HEXACHLORODIBENZO-P-DIOXIN	N										1	1	1	1
	MEAN										20	12	7	9
	STD													
1234678-HEPTACHLORODIBENZO-P-DIOXIN	N										1	1	1	
	MEAN										10	6	6	
	STD													
OCTACHLORODIBENZO-P-DIOXIN	N										1	1	1	1
	MEAN										14	10	10	10
	STD													
2378-TETRACHLORODIBENZOFURAN	N										1	1	1	1
	MEAN										2	ND	2	ND
	STD													
23478-PENTACHLORODIBENZOFURAN	N										1	1	1	1
	MEAN										11	4	6	5
	STD													
123478-/123467-HEXACHLORODIBENZOFURAN	N										1	1	1	1
	MEAN										5	4	4	4
	STD													
123678-HEXACHLORODIBENZOFURAN	N										1	1	1	1
	MEAN										6	4	5	4
	STD													

[*] All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.*

LAKE ONTARIO, MUGG'S ISLAND

HERRING GULL		YEAR												
		74	75	77	78	79	80	81	82	83	84	85	86	87
HEPTACHLOR EPOXIDE	N	9	10	9	4	8	9	10	9	11	10	10	10	1
	MEAN	.1389	0.029	0.07	0.085	.0625	0.09	0.095	.0933	.0409	0.058	0.062	.0782	.0542
	STD	.0226	.0129	.0354	.0311	.0128	.0361	.0299	.0287	.0284	.0155	.0132	.0138	
ALPHA-HEXACHLORO-CYCLOHEXANE	N									11	10	10		1
	MEAN									.0041	.0025	0.004		.0025
	STD									.0023	0	.0013		
BETA-HEXACHLORO-CYCLOHEXANE	N			10	4	10	9	10	9	11	10	10	10	1
	MEAN			0.084	.0625	0.046	.0433	0.048	.0267	.0218	0.02	.0095	.0119	.0031
	STD			.0263	.0126	.0241	.0212	.0225	.0158	.0087	.0082	.0016	.0048	
GAMMA-HEXACHLORO-CYCLOHEXANE	N													1
	MEAN													.0021
	STD													
LEAD	N			10										
	MEAN			0.247										
	STD			.1587										
TOTAL MERCURY	N	9	10					10	9	11		10		
	MEAN	.4989	0.775					0.48	.5411	.2364		0.387		
	STD	0.098	.3724					.1317	.0535	.0446		.2078		
MIREX	N	9	10	10	4	10	9	10	9	10	10	10	10	1
	MEAN	7.44	3.421	2.051	1.55	1.812	1.722	2.534	3.691	1.36	1.722	1.262	.9815	.5024
	STD	4.748	1.424	.4323	.5148	.8695	1.054	1.12	1.279	.5869	.7348	.5606	.2934	
PHOTOMIREX	N			10	4	10							10	1
	MEAN			0.83	0.495	0.719							.3919	.2067
	STD			.2438	.1586	.3318							.1087	
CIS-NONACHLOR	N												10	1
	MEAN												.0677	.0409
	STD												.0165	

---

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.*

LAKE ONTARIO, MUGG'S ISLAND

HERRING GULL		YEAR												
		74	75	77	78	79	80	81	82	83	84	85	86	87
TRANS-NONACHLOR	N								9	11	10	10	10	1
	MEAN								.0833	.0273	.0125	0.015	.0797	.0495
	STD								.0458	.0174	.0054	.0053	.0512	
OCTACHLORO-STYRENE	N													1
	MEAN													0.017
	STD													
PCB 1260	N	9	10	10	4	10	9	10	9	11	10		10	1
	MEAN	125.8	81.99	73.17	64.25	65.4	52.71	64.81	59.14	32.7	40.72		10.21	6.938
	STD	36.12	15.98	18.43	9.533	22.58	25.1	26.9	18.63	13.29	16.93		2.274	
PCB 1254:1260 (conversion to total PCB congener conc see pg. 39)	N	9	10	10	4	10	9	10	9	11	10	10	10	1
	MEAN	165.6	106.6	86.62	76.98	76.29	59.69	72.17	64.47	39.01	48.87	36.57	25.04	15.62
	STD	47.68	20.79	19.51	14.14	29.74	28.83	29.98	20.47	15.27	20.13	8.623	5.464	
SELENIUM	N			10										
	MEAN			0.49										
	STD			.2025										

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.[1]

LAKE ONTARIO, MUGG'S ISLAND

COMMON TERN		YEAR
		72
PERCENT LIPID IN EGG	N	5
	MEAN	7.04
	STD	1.68
HEXA-CHLOROBENZENE	N	5
	MEAN	0.732
	STD	.4923
DDD	N	5
	MEAN	0.238
	STD	.2009
DDE	N	5
	MEAN	18.94
	STD	9.417
DDT	N	5
	MEAN	.3554
	STD	.3295
DIELDRIN	N	5
	MEAN	0.408
	STD	.2602
HEPTACHLOR EPOXIDE	N	5
	MEAN	0.236
	STD	.1598
TOTAL MERCURY	N	5
	MEAN	1.066
	STD	0.229
PCB 1260	N	5
	MEAN	87.84
	STD	45.58

[1] All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.'

LAKE ONTARIO, MUGG'S ISLAND

RING-BILLED GULL		YEAR 79
PERCENT LIPID IN EGG	N	24
	MEAN	9.904
	STD	1.095
ALPHA-CHLORDANE	N	14
	MEAN	.0671
	STD	.0432
OXY-CHLORDANE	N	24
	MEAN	.0758
	STD	.0418
HEXA-CHLOROBENZENE	N	24
	MEAN	.1192
	STD	.0466
DDD	N	24
	MEAN	.1104
	STD	.0418
DDE	N	24
	MEAN	3.019
	STD	1.321
DDT	N	24
	MEAN	.0263
	STD	.0134
DIELDRIN	N	24
	MEAN	.5221
	STD	.2546
HEPTACHLOR EPOXIDE	N	24
	MEAN	.0804
	STD	.0505

'All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.*

LAKE ONTARIO, MUGG'S ISLAND

RING-BILLED GULL		YEAR 79
BETA-HEXACHLORO-CYCLOHEXANE	N	24
	MEAN	.0275
	STD	.0107
MIREX	N	24
	MEAN	.7471
	STD	0.408
PHOTOMIREX	N	24
	MEAN	.2658
	STD	.1534
PCB 1260	N	24
	MEAN	21.21
	STD	10
PCB 1254:1260 (conversion to total PCB congener conc see pg. 39)	N	24
	MEAN	27.25
	STD	11.8

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.[*]

LAKE ONTARIO, HAMILTON HARBOUR

HERRING GULL		YEAR				
		81	82	84	86	87
PERCENT LIPID IN EGG	N	10	1	1	1	1
	MEAN	9.77	8.7	8.7	6.8	9.2
	STD	.7304				
ALPHA-CHLORDANE	N	10	1	1	1	1
	MEAN	0.335	0.02	0.02	0.013	.0121
	STD	.0768				
GAMMA-CHLORDANE	N	7	1	1		1
	MEAN	.0829	0.01	0.05		.0016
	STD	0.015				
OXY-CHLORDANE	N	10	1	1	1	1
	MEAN	0.329	0.3	0.18	0.146	.1012
	STD	.2156				
1234-CHLOROBENZENE	N	10	1	1		1
	MEAN	.0059	0.003	0.022		.0176
	STD	.0014				
1235-/ 1245-CHLOROBENZENE	N	10	1	1		1
	MEAN	.0046	0.006	0.004		.0266
	STD	.0044				
PENTA-CHLOROBENZENE	N	10	1	1		1
	MEAN	.0248	0.017	0.012		.0097
	STD	.0062				
HEXA-CHLOROBENZENE	N	10	1	1	1	1
	MEAN	.2255	0.126	0.065	0.042	.0438
	STD	.0716				
DDD	N	10	1	1	1	1
	MEAN	0.102	0.09	0.02	0.033	.0139
	STD	.0286				

---

[*] All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.*

LAKE ONTARIO, HAMILTON HARBOUR

HERRING GULL		YEAR				
		81	82	84	86	87
DDE	N	10	1	1	1	1
	MEAN	11.1	4.76	5.12	4.08	2.409
	STD	3.947				
DDT	N	10	1	1	1	1
	MEAN	0.114	0.09	0.02	0.357	.0339
	STD	.0267				
DIELDRIN	N	10	1	1	1	1
	MEAN	0.264	0.2	0.2	0.171	.1139
	STD	.0638				
2378-TETRACHLORO-DIBENZO-P-DIOXIN	N			1	1	1
	MEAN			50	44	49
	STD					
12378-PENTACHLORO-DIBENZO-P-DIOXIN	N			1	1	1
	MEAN			9	8	7
	STD					
123678-HEXACHLORO-DIBENZO-P-DIOXIN	N			1	1	1
	MEAN			15	14	11
	STD					
1234678-HEPTACHLORO-DIBENZO-P-DIOXIN	N			1	1	
	MEAN			6	6	
	STD					
OCTACHLORO-DIBENZO-P-DIOXIN	N			1	1	1
	MEAN			12	10	10
	STD					
2378-TETRACHLORO-DIBENZOFURAN	N			1	1	1
	MEAN			2	ND	ND
	STD					

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.[*]

LAKE ONTARIO, HAMILTON HARBOUR

HERRING GULL		YEAR				
		81	82	84	86	87
23478-PENTACHLORO-DIBENZOFURAN	N			1	1	1
	MEAN			10	7	7
	STD					
123478-/ 123467-HEXACHLORO-DIBENZOFURAN	N			1	1	1
	MEAN			5	4	ND
	STD					
123678-HEXACHLORO-DIBENZOFURAN	N			1	1	1
	MEAN			4	4	ND
	STD					
HEPTACHLOR EPOXIDE	N	8	1	1	1	1
	MEAN	.1162	0.1	0.04	0.081	.0687
	STD	0.02				
ALPHA-HEXACHLORO-CYCLOHEXANE	N		1	1		1
	MEAN		.0025	.0025		.0025
	STD					
BETA-HEXACHLORO-CYCLOHEXANE	N	10	1	1	1	1
	MEAN	0.058	0.03	0.02	.0005	.0031
	STD	.0148				
GAMMA-HEXACHLORO-CYCLOHEXANE	N					1
	MEAN					.0021
	STD					
TOTAL MERCURY	N	10	1			
	MEAN	0.388	0.48			
	STD	0.094				
MIREX	N	10	1	1	1	1
	MEAN	1.941	2.35	1.34	0.711	.5805
	STD	.6474				

[*] All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.[*]

LAKE ONTARIO, HAMILTON HARBOUR

HERRING GULL		YEAR				
		81	82	84	86	87
PHOTOMIREX	N				1	1
	MEAN				0.272	.1605
	STD					
CIS-NONACHLOR	N				1	1
	MEAN				0.052	.0414
	STD					
TRANS-NONACHLOR	N		1	1	1	1
	MEAN		0.04	0.02	0.078	.0074
	STD					
OCTACHLORO-STYRENE	N					1
	MEAN					.0103
	STD					
PCB 1260	N	10	1	1	1	1
	MEAN	71.46	25.7	35.4	10	8.517
	STD	18.44				
PCB 1254:1260 (conversion to total PCB congener conc see pg. 39)	N	10	1	1	1	1
	MEAN	79.33	31.7	43.6	24.8	17.96
	STD	20.94				

[*]All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.[*]

LAKE ONTARIO, HAMILTON HARBOUR

COMMON TERN		YEAR 71
PERCENT LIPID IN EGG	N	25
	MEAN	7.448
	STD	4.382
HEXA-CHLOROBENZENE	N	25
	MEAN	.9512
	STD	.5752
DDD	N	25
	MEAN	0.582
	STD	.4334
DDE	N	25
	MEAN	16.84
	STD	8.587
DDT	N	25
	MEAN	.3083
	STD	.3226
DIELDRIN	N	25
	MEAN	.5476
	STD	.2455
HEPTACHLOR EPOXIDE	N	25
	MEAN	.0984
	STD	.0425
TOTAL MERCURY	N	25
	MEAN	1.12
	STD	.3746
PCB 1260	N	25
	MEAN	96.67
	STD	33.85

[*] All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.[*]

LAKE ONTARIO, HAMILTON HARBOUR

RING-BILLED GULL		YEAR 84
PERCENT LIPID IN EGG	N	10
	MEAN	8.74
	STD	.8682
ALPHA-CHLORDANE	N	10
	MEAN	0.061
	STD	.0929
GAMMA-CHLORDANE	N	10
	MEAN	.0287
	STD	.0646
OXY-CHLORDANE	N	10
	MEAN	0.095
	STD	0.045
1234-CHLOROBENZENE	N	10
	MEAN	.0005
	STD	0
1235-/ 1245-CHLOROBENZENE	N	10
	MEAN	.0005
	STD	0
PENTA-CHLOROBENZENE	N	10
	MEAN	.0008
	STD	.0006
HEXA-CHLOROBENZENE	N	10
	MEAN	.0436
	STD	.0526
DDD	N	10
	MEAN	0.031
	STD	.0237

---

[*] All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.[*]

LAKE ONTARIO, HAMILTON HARBOUR

RING-BILLED GULL		YEAR
		84
DDE	N	10
	MEAN	3.222
	STD	2.714
DDT	N	10
	MEAN	.0325
	STD	.0321
DIELDRIN	N	10
	MEAN	0.409
	STD	.2563
HEPTACHLOR EPOXIDE	N	10
	MEAN	0.107
	STD	.0492
ALPHA-HEXACHLORO-CYCLOHEXANE	N	10
	MEAN	.0025
	STD	0
BETA-HEXACHLORO-CYCLOHEXANE	N	10
	MEAN	0.004
	STD	.0013
MIREX	N	10
	MEAN	0.504
	STD	.1812
TRANS-NONACHLOR	N	10
	MEAN	0.04
	STD	.0294
PCB 1260	N	10
	MEAN	15.19
	STD	10.8

---

[*] All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.[*]

LAKE ONTARIO, HAMILTON HARBOUR

RING-BILLED GULL		YEAR
		84
PCB 1254:1260 (conversion to total PCB congener conc see pg. 39)	N	10
	MEAN	18.78
	STD	13.36

---

[*] All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.'

NIAGARA RIVER

HERRING GULL		YEAR								
		79	81	82	83	84	85	86	87	88
PERCENT LIPID IN EGG	N	10	10	1	11	10	10	10	1	1
	MEAN	8.72	9.58	8.8	7.855	9.56	9.19	8.39	8.9	7.8
	STD	.5051	.6925		.4435	1.502	.7937	.5021		
ALPHA-CHLORDANE	N	10	10	1	11	10	10	10	1	1
	MEAN	0.118	0.178	0.02	.0175	0.015	0.013	0.01	.0074	.0246
	STD	.0464	.0547		.0086	.0071	.0067	.0041		
GAMMA-CHLORDANE	N		5	1	11	10	10		1	1
	MEAN		.0104	0.01	.0036	.0065	.0055		.0016	.0013
	STD		.0221		.0013	.0024	.0016			
OXY-CHLORDANE	N	10	10	1	11	10	10	10	1	1
	MEAN	0.125	0.17	0.15	0.2	0.185	0.13	.1382	.1018	.0014
	STD	.0372	.0829		.0631	.0853	.0403	.0397		
135-CHLOROBENZENE	N	10								
	MEAN	0.001								
	STD	0								
124-CHLOROBENZENE	N	10								
	MEAN	.0212								
	STD	.0236								
123-CHLOROBENZENE	N	10								
	MEAN	.0063								
	STD	.0062								
1234-CHLOROBENZENE	N	10	10	1	11	10	10		1	1
	MEAN	.0527	.0434	0.01	.0031	.0118	.0094		.0176	.0175
	STD	.0791	.0734		.0024	.0106	.0078			
PENTA-CHLOROBENZENE	N	10	10	1	11	10	10		1	1
	MEAN	.0471	.0538	0.02	.0102	.0214	.0103		.0097	.0103
	STD	.0453	.0853		.0043	.0192	.0065			
1235-/ 1245-CHLOROBENZENE	N	10	10	1	11	10	10		1	1
	MEAN	.0201	.0189	0.009	.0029	.0061	.0034		.0266	.0237
	STD	.0181	0.021		.0025	.0043	.0042			

'All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.[*]

NIAGARA RIVER

HERRING GULL		YEAR								
		79	81	82	83	84	85	86	87	88
HEXA-CHLOROBENZENE	N	10	10	1	11	10	10	10	1	1
	MEAN	0.173	.1318	0.117	0.068	.0993	.0532	.0569	.0311	.0374
	STD	.0514	.0864		.0372	.0416	.0094	.0171		
DDD	N	10	10	1	11	10	10	10	1	1
	MEAN	0.137	0.059	0.02	.0218	0.009	0.028	.0014	.0081	.0121
	STD	.0313	0.036		.0199	.0021	.0162	.0027		
DDE	N	10	10	1	11	10	10	10	1	1
	MEAN	4.005	5.677	3.65	3.868	3.348	4.12	2.727	1.51	1.69
	STD	1.334	2.642		1.143	1.081	1.09	1.016		
DDT	N	10	10	1	11	10	10	10	1	1
	MEAN	0.055	0.055	0.06	0.01	0.01	0.029	.0174	.0122	.0277
	STD	.0366	.0334		0	.0041	.0099	.0098		
DIELDRIN	N	10	10	1	11	10	10	10	1	1
	MEAN	0.201	0.238	0.15	0.22	0.271	0.195	.1688	.1427	.1732
	STD	.0769	.1485		0.05	.2146	.0515	.0728		
2378-TETRACHLORO-DIBENZO-P-DIOXIN	N		1	1	1	1	1	1	1	1
	MEAN		87	69	19	41	41	40	23	12
	STD									
12378-PENTACHLORO-DIBENZO-P-DIOXIN	N		1	1	1	1	1	1	1	1
	MEAN		12	10	5	14	12	10	6	4
	STD									
123678-HEXACHLORO-DIBENZO-P-DIOXIN	N		1	1	1	1	1	1	1	1
	MEAN		22	14	14	15	11	10	9	6
	STD									
1234678-HEPTACHLORO-DIBENZO-P-DIOXIN	N		1	1	1	1	1	1	1	1
	MEAN		8	8	8	5	6	6	6	2
	STD									

---

[*] All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.*

NIAGARA RIVER

HERRING GULL		YEAR								
		79	81	82	83	84	85	86	87	88
OCTACHLORO-DIBENZO-P-DIOXIN	N		1	1	1	1	1	1	1	1
	MEAN		10	10	10	6	10	ND	10	3
	STD									
2378-TETRACHLORO-DIBENZOFURAN	N					1	1	1	1	1
	MEAN					2	ND	ND	2	ND
	STD									
23478-PENTACHLORO-DIBENZOFURAN	N					1	1	1	1	1
	MEAN					17	10	9	7	5
	STD									
123478-/123467-HEXACHLORO-DIBENZOFURAN	N					1	1	1		1
	MEAN					9	5	4		ND
	STD									
123678-HEXACHLORO-DIBENZOFURAN	N					1	1	1	1	1
	MEAN					9	4	4	4	ND
	STD									
HEPTACHLOR EPOXIDE	N	10	10	1	11	10	10	10	1	1
	MEAN	0.09	0.106	0.12	.1582	0.097	0.075	.0906	.0719	.0706
	STD	0.017	.0327		0.059	.0383	.0172	.0273		
ALPHA-HEXACHLORO-CYCLOHEXANE	N			1	11	10	10		1	1
	MEAN			0.01	.0082	0.003	.0043		.0025	.0026
	STD				.0025	.0011	.0012			
BETA-HEXACHLORO-CYCLOHEXANE	N	10	10	1	11	10	10	10	1	1
	MEAN	0.073	0.037	0.05	.0209	0.018	0.007	.0149	.0031	0.012
	STD	.0519	.0221		.0083	.0103	.0026	0.009		
GAMMA-HEXACHLORO-CYCLOHEXANE	N								1	1
	MEAN								.0021	.0024
	STD									

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.*

NIAGARA RIVER

HERRING GULL		YEAR								
		79	81	82	83	84	85	86	87	88
TOTAL MERCURY	N		10	1	11		10			
	MEAN		0.236	0.35	0.15		0.164			
	STD		.0819		.0407		.0636			
MIREX	N	10	10	1	8	10	10	10	1	1
	MEAN	0.493	0.738	0.98	.3338	0.568	0.587	0.364	.2377	.2107
	STD	.2432	.4982		.2576	.1989	.3135	.1366		
PHOTOMIREX	N	10						10	1	1
	MEAN	0.175						0.145	.0649	.0869
	STD	.0945						.0563		
CIS-NONACHLOR	N							10	1	1
	MEAN							0.058	.0331	.0593
	STD							.0185		
TRANS-NONACHLOR	N			1	11	10	10	10	1	1
	MEAN			0.04	.0164	0.025	.0105	.0739	.0423	.0565
	STD				.0081	.0108	.0037	0.019		
OCTACHLORO-STYRENE	N								1	1
	MEAN								.0103	0.008
	STD									
PCB 1260	N	10	10	1	11	10		10	1	1
	MEAN	44.14	44.23	38.8	28.12	30.74		11	6.175	5.539
	STD	18.24	23.55		17.44	12.38		5.316		
PCB 1254:1260 (conversion to total PCB congener conc see pg. 39)	N	10	10	1	11	10	10	10	1	1
	MEAN	50.47	50.35	45.5	34.06	37.27	29.13	22.55	12.83	12.45
	STD	22.51	25.1		20.37	14.52	11.02	10.62		

---

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.[*]

NIAGARA RIVER

BLACK-CROWNED NIGHT-HERON		YEAR	
		82	86
PERCENT LIPID IN EGG	N	1	1
	MEAN	5.6	5.5
	STD		
ALPHA-CHLORDANE	N	1	1
	MEAN	0.01	0.026
	STD		
OXY-CHLORDANE	N	1	1
	MEAN	0.14	0.127
	STD		
1234-CHLOROBENZENE	N	1	
	MEAN	0.01	
	STD		
1235-/ 1245-CHLOROBENZENE	N	1	
	MEAN	0.006	
	STD		
PENTA-CHLOROBENZENE	N	1	
	MEAN	0.013	
	STD		
HEXA-CHLOROBENZENE	N	1	1
	MEAN	0.061	0.055
	STD		
DDD	N	1	1
	MEAN	0.08	0.095
	STD		
DDE	N	1	1
	MEAN	4.81	3.27
	STD		

---

[*] All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.[*]

NIAGARA RIVER

BLACK-CROWNED NIGHT-HERON		YEAR	
		82	86
DDT	N	1	1
	MEAN	0.11	0.079
	STD		
DIELDRIN	N	1	1
	MEAN	0.31	0.218
	STD		
HEPTACHLOR EPOXIDE	N	1	1
	MEAN	0.06	0.068
	STD		
ALPHA-HEXACHLORO-CYCLOHEXANE	N	1	
	MEAN	0.01	
	STD		
BETA-HEXACHLORO-CYCLOHEXANE	N	1	1
	MEAN	0.35	0.099
	STD		
MIREX	N	1	1
	MEAN	0.75	0.903
	STD		
CIS-NONACHLOR	N		1
	MEAN		0.11
	STD		
PHOTOMIREX	N		1
	MEAN		0.362
	STD		
TRANS-NONACHLOR	N	1	1
	MEAN	0.07	0.258
	STD		

---

[*] All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.[*]

NIAGARA RIVER

BLACK-CROWNED NIGHT-HERON		YEAR	
		82	86
PCB 1260	N	1	1
	MEAN	17.4	14.3
	STD		
PCB 1254:1260 (conversion to total PCB congener conc see pg. 39)	N	1	1
	MEAN	18.9	33.4
	STD		

---

[*] All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.[*]

LAKE ERIE, PORT COLBOURNE, CANADA FURNACE

COMMON TERN		YEAR
		73
PERCENT LIPID IN EGG	N	6
	MEAN	8.233
	STD	.5086
HEXA-CHLOROBENZENE	N	6
	MEAN	0.04
	STD	0.011
DDD	N	6
	MEAN	0.115
	STD	.0513
DDE	N	6
	MEAN	2.662
	STD	1.027
DDT	N	6
	MEAN	.0484
	STD	.0261
DIELDRIN	N	6
	MEAN	0.235
	STD	.1131
HEPTACHLOR EPOXIDE	N	6
	MEAN	.0383
	STD	.0172
TOTAL MERCURY	N	6
	MEAN	.5533
	STD	.2303
PCB 1260	N	6
	MEAN	16.08
	STD	2.487

---

[*] All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.*

LAKE ERIE, PORT COLBORNE LIGHTHOUSE

HERRING GULL		YEAR													
		74	75	77	78	79	80	81	82	83	84	85	86	87	88
PERCENT LIPID IN EGG	N	10	10	10	10	10	9	10	1	11	10	10	1	10	1
	MEAN	8.5	8.21	9.84	8.95	8.59	7.611	9.63	10.6	8.273	9.52	9.17	7.6	9.64	8.5
	STD	1.05	.6471	1.636	.9664	.4771	.4676	1.008		.9056	1.409	.6056		1.284	
ARSENIC	N			1											
	MEAN			0.015											
	STD														
CADMIUM	N			1											
	MEAN			0.011											
	STD														
ALPHA-CHLORDANE	N			10		10	9	10	1	11	10	10	1	10	1
	MEAN			0.02		0.123	0.11	0.291	0.03	.0109	0.021	0.022	0.009	.0122	.0122
	STD			.0047		.0254	.0415	.0987		0.003	.0057	.0063		.0077	
GAMMA-CHLORDANE	N							10	1	11	10	10		10	1
	MEAN							.0871	0.01	.0025	.0065	.0073		.0016	.0013
	STD							.0664		0	.0024	0.003		0	
OXY-CHLORDANE	N			10	10	10	9	10	1	11	10	10	1	10	1
	MEAN			.1380	0.122	0.099	.1167	0.131	0.34	.1573	0.226	0.17	0.15	.0998	.1084
	STD			.1169	.0322	.0378	0.066	.0398		.0771	.1361	.0963		.0449	
123-CHLOROBENZENE	N					10									
	MEAN					.0029									
	STD					0.006									
124-CHLOROBENZENE	N					10									
	MEAN					.0046									
	STD					.0053									
135-CHLOROBENZENE	N					10									
	MEAN					0.001									
	STD					0									

---

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.*

LAKE ERIE, PORT COLBORNE LIGHTHOUSE

HERRING GULL		YEAR													
		74	75	77	78	79	80	81	82	83	84	85	86	87	88
1234-CHLOROBENZENE	N					10	9	10	1	11	10	10		10	1
	MEAN					.0047	.0108	.0014	0.004	.0026	0.005	.0008		.0176	.0175
	STD					.0036	.0242	.0019		0.004	0.011	.0015		0	
1235-/ 1245-CHLOROBENZENE	N					10	9	10	1	11	10	10		10	1
	MEAN					.0052	.0032	.0005	0.007	0.002	.0027	.0007		.0265	.0237
	STD					.0036	.0045	0		.0027	.0043	.0012		.0002	
PENTA-CHLOROBENZENE	N					10	9	10	1	11	10	10		10	1
	MEAN					.0108	.0081	.0128	0.014	.0075	.0075	.0067		.0123	.0103
	STD					0.004	.0023	.0079		0.005	.0042	0.005		.0081	
HEXA-CHLOROBENZENE	N	10	10	10	10	10	9	10	1	11	10	10	1	10	1
	MEAN	.2052	.1615	.1910	0.089	0.097	.0848	.0848	0.079	.0558	0.062	.0531	0.052	.0282	.0338
	STD	.0505	.0432	.0314	.0173	0.017	.0231	.0285		.0375	.0169	0.014		.0088	
DDD	N	10	10	10		10	9	10	1	11	10	10	1	10	1
	MEAN	0.182	.0952	.1610		0.119	.0956	0.049	0.15	.0164	0.013	0.023	.0005	.0115	.0082
	STD	.0498	.0172	.0331		.0242	.0292	.0173		.0081	.0048	.0082		.0091	
DDE	N	10	10	10	10	10	9	10	1	11	10	10	1	10	1
	MEAN	8.71	7.915	7.551	5.598	3.437	3.4	4.736	7.46	3.05	4.427	3.619	3.21	1.736	1.93
	STD	3.274	1.857	1.669	1.326	1.004	1.512	1.717		1.306	1.373	1.134		.9458	
DDT	N	10	10	10	10	10	9	10	1	11	10	10	1	10	1
	MEAN	.2318	.1064	.0620	0.086	0.03	.1133	0.045	0.09	.0095	0.012	0.03	0.025	.0202	.0167
	STD	.0748	.0561	.0301	.0617	.0133	.1042	.0165		.0042	.0063	.0133		.0047	
DIELDRIN	N	10	10	10	10	10	9	10	1	11	10	10	1	10	1
	MEAN	0.37	0.377	0.502	0.278	0.244	.2656	0.244	0.36	.1727	0.341	0.157	0.204	.1373	.1802
	STD	.1288	.1384	.2561	.0913	.0829	.1308	.0866		.0775	.2477	0.056		.0607	
2378-TETRACHLORO-DIBENZO-P-DIOXIN	N										1	1	1	1	1
	MEAN										32	17	32	15	17
	STD														

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.[*]

LAKE ERIE, PORT COLBORNE LIGHTHOUSE

HERRING GULL		YEAR													
		74	75	77	78	79	80	81	82	83	84	85	86	87	88
12378-PENTACHLORO-DIBENZO-P-DIOXIN	N										1	1	1	1	1
	MEAN										9	8	9	5	6
	STD														
123678-HEXACHLORO-DIBENZO-P-DIOXIN	N										1	1	1	1	1
	MEAN										11	12	12	6	10
	STD														
1234678-HEPTACHLORO-DIBENZO-P-DIOXIN	N										1	1	1	1	1
	MEAN										9	6	6	6	2
	STD														
OCTACHLORO-DIBENZO-P-DIOXIN	N										1	1	1	1	1
	MEAN										15	10	10	ND	4
	STD														
2378-TETRACHLORO-DIBENZOFURAN	N										1	1	1	1	1
	MEAN										5	ND	ND	ND	ND
	STD														
23478-PENTACHLORO-DIBENZOFURAN	N										1	1	1	1	1
	MEAN										24	5	6	3	6
	STD														
123478-/123467-HEXACHLORO-DIBENZOFURAN	N										1	1	1	1	1
	MEAN										9	4	4	ND	2
	STD														
123678-HEXACHLORO-DIBENZOFURAN	N										1	1	1	1	1
	MEAN										10	4	4	4	2
	STD														
HEPTACHLOR EPOXIDE	N	10	10	10	10	10	9	6	1	11	10	10	1	10	1
	MEAN	0.158	0.151	0.096	0.094	0.082	.1278	0.09	0.17	.0664	0.129	0.114	0.121	.0845	.0951
	STD	.0349	0.037	.0583	.0306	.0148	.0567	.0167		.0317	.0436	.0184		.0246	

---

[*] All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.*

LAKE ERIE, PORT COLBORNE LIGHTHOUSE

HERRING GULL		YEAR													
		74	75	77	78	79	80	81	82	83	84	85	86	87	88
ALPHA-HEXACHLORO-CYCLOHEXANE	N								1	11	10	10		10	1
	MEAN								0.01	.0091	.0045	.0055		.0025	.0026
	STD									0.002	.0011	.0016		0	
BETA-HEXACHLORO-CYCLOHEXANE	N			10	10	10	9	10	1	11	10	10	1	10	1
	MEAN			0.045	0.029	0.015	.0133	0.02	0.03	.0127	0.017	0.01	.0005	.0031	.0032
	STD			.0085	.0074	.0053	0.005	.0105		.0047	.0067	0		0	
GAMMA-HEXACHLORO-CYCLOHEXANE	N													10	1
	MEAN													.0021	.0024
	STD													0	
LEAD	N			1											
	MEAN			0.24											
	STD														
TOTAL MERCURY	N	10	10					10	1	11		10			
	MEAN	0.211	0.268					0.244	0.54	.2209		0.298			
	STD	.0363	.0466					.0762		0.081		.1147			
MIREX	N	10	10	10	10	10	9	10	1	11	10	10	1	10	1
	MEAN	0.844	0.419	0.511	0.379	0.245	.2844	0.424	0.6	.2891	0.382	0.235	0.25	.2123	.1814
	STD	.5057	.1658	.1981	.1569	.0902	.1826	.4674		.2333	.2524	.0789		.1698	
CIS-NONACHLOR	N												1	10	1
	MEAN												0.053	.0365	.0453
	STD													.0101	
PHOTOMIREX	N			10	10	10							1	10	1
	MEAN			0.195	0.115	0.095							0.109	0.055	.0783
	STD			0.06	.0599	.0428								0.052	
TRANS-NONACHLOR	N								1	11	10	10	1	10	1
	MEAN								0.06	.0173	0.019	0.014	0.068	.0539	.0556
	STD									.0127	.0074	0.007		.0237	

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.*

LAKE ERIE, PORT COLBORNE LIGHTHOUSE

HERRING GULL		YEAR													
		74	75	77	78	79	80	81	82	83	84	85	86	87	88
OCTACHLORO-STYRENE	N													10	1
	MEAN													.0103	0.008
	STD													0	
PCB 1260	N	10	10	10	10	10	9	10	1	11	10		1	10	1
	MEAN	55.1	41.46	50.01	38.31	31.09	32.91	39.79	50.7	30.79	38.79		9.79	7.845	8.051
	STD	14.79	10.43	10.41	9.263	4.578	12.74	11.76		18.38	12.93			2.616	
PCB 1254:1260 (conversion to total PCB congener conc see pg. 39)	N	10	10	10	10	10	9	10	1	11	10	10	1	10	1
	MEAN	72.56	53.91	59.27	46.43	37.59	37.59	44.36	59.7	36.76	45.13	29.66	23.7	15.63	17.59
	STD	19.52	13.52	12.73	10.81	6.216	15.75	12.88		21.37	14.66	12.81		5.616	
SELENIUM	N			1											
	MEAN			1.3											
	STD														

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.[*]

LAKE ERIE, PORT COLBORNE LIGHTHOUSE

COMMON TERN		YEAR	
		72	73
PERCENT LIPID IN EGG	N	4	2
	MEAN	8.175	7.2
	STD	.8261	.5657
HEXA-CHLOROBENZENE	N	4	2
	MEAN	.0825	0.05
	STD	.0457	0
DDD	N	4	2
	MEAN	.1475	0.13
	STD	0.033	0
DDE	N	4	2
	MEAN	6.42	3.535
	STD	1.786	1.959
DDT	N	4	2
	MEAN	.0011	.0894
	STD	0	.0316
DIELDRIN	N	4	2
	MEAN	.2625	0.25
	STD	.0665	.0707
HEPTACHLOR EPOXIDE	N	4	2
	MEAN	.0525	0.04
	STD	.0206	.0141
TOTAL MERCURY	N	4	2
	MEAN	0.56	0.495
	STD	.2165	.1061
PCB 1260	N	4	2
	MEAN	45.6	20.75
	STD	14.94	7.849

---

[*] All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.[*]

LAKE ERIE, MOHAWK ISLAND

HERRING GULL		YEAR 78
PERCENT LIPID IN EGG	N	10
	MEAN	9.67
	STD	.9684
OXY-CHLORDANE	N	10
	MEAN	0.158
	STD	.1186
HEXA-CHLOROBENZENE	N	10
	MEAN	0.116
	STD	.0425
DDE	N	10
	MEAN	4.445
	STD	1.195
DDT	N	10
	MEAN	0.044
	STD	.0126
DIELDRIN	N	10
	MEAN	0.322
	STD	.2443
HEPTACHLOR EPOXIDE	N	10
	MEAN	0.112
	STD	.0471
BETA-HEXACHLORO-CYCLOHEXANE	N	10
	MEAN	.0255
	STD	.0164
MIREX	N	10
	MEAN	0.258
	STD	.1497

---

[*] All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.[*]

LAKE ERIE, MOHAWK ISLAND

HERRING GULL		YEAR
		78
PHOTOMIREX	N	10
	MEAN	0.092
	STD	.0473
PCB 1260	N	10
	MEAN	29.69
	STD	6.957
PCB 1254:1260 (conversion to total PCB congener conc see pg. 39)	N	10
	MEAN	34.74
	STD	7.908

---

[*] All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.[*]

LAKE ERIE, LONG POINT PROVINCIAL PARK

FORSTERS TERN		YEAR
		86
PERCENT LIPID IN EGG	N	1
	MEAN	7.3
	STD	
ALPHA-CHLORDANE	N	1
	MEAN	0.025
	STD	
OXY-CHLORDANE	N	1
	MEAN	0.038
	STD	
HEXA-CHLOROBENZENE	N	1
	MEAN	0.017
	STD	
DDD	N	1
	MEAN	.0005
	STD	
DDE	N	1
	MEAN	1.21
	STD	
DDT	N	1
	MEAN	0.03
	STD	
DIELDRIN	N	1
	MEAN	0.127
	STD	
HEPTACHLOR EPOXIDE	N	1
	MEAN	0.039
	STD	

---

[*] All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.[*]

LAKE ERIE, LONG POINT PROVINCIAL PARK

FORSTERS TERN		YEAR
		86
BETA-HEXACHLOROCYCLOHEXANE	N	1
	MEAN	.0005
	STD	
MIREX	N	1
	MEAN	0.025
	STD	
CIS-NONACHLOR	N	1
	MEAN	0.072
	STD	
PHOTOMIREX	N	1
	MEAN	.0005
	STD	
TRANS-NONACHLOR	N	1
	MEAN	0.22
	STD	
PCB 1260	N	1
	MEAN	4.65
	STD	
PCB 1254:1260 (conversion to total PCB congener conc see pg. 39)	N	1
	MEAN	11.4
	STD	

---

[*] All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.[*]

LAKE ERIE, SANDUSKY TURNING POINT

HERRING GULL		YEAR
		79
PERCENT LIPID IN EGG	N	10
	MEAN	9.36
	STD	.7321
ALPHA-CHLORDANE	N	10
	MEAN	0.165
	STD	.0484
OXY-CHLORDANE	N	10
	MEAN	0.142
	STD	.0804
123-CHLOROBENZENE	N	10
	MEAN	.0037
	STD	0.003
124-CHLOROBENZENE	N	10
	MEAN	.0158
	STD	.0067
135-CHLOROBENZENE	N	10
	MEAN	0.001
	STD	0
1234-CHLOROBENZENE	N	10
	MEAN	.0046
	STD	.0021
1235-/ 1245-CHLOROBENZENE	N	10
	MEAN	.0102
	STD	.0028
PENTA-CHLOROBENZENE	N	10
	MEAN	.0118
	STD	.0052

[*] All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.[*]

LAKE ERIE, SANDUSKY TURNING POINT

HERRING GULL		YEAR
		79
HEXA-CHLOROBENZENE	N	10
	MEAN	0.102
	STD	.0352
DDD	N	10
	MEAN	0.096
	STD	.0409
DDE	N	10
	MEAN	2.981
	STD	1.525
DDT	N	10
	MEAN	0.035
	STD	.0108
DIELDRIN	N	10
	MEAN	0.274
	STD	.1226
HEPTACHLOR EPOXIDE	N	9
	MEAN	.1344
	STD	.0513
BETA-HEXACHLORO-CYCLOHEXANE	N	10
	MEAN	0.015
	STD	.0071
MIREX	N	10
	MEAN	0.2
	STD	.2308
PHOTOMIREX	N	10
	MEAN	0.074
	STD	.0828

[*] All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.[*]

LAKE ERIE, SANDUSKY TURNING POINT

HERRING GULL		YEAR
		79
PCB 1260	N	10
	MEAN	46.32
	STD	10.3
PCB 1254:1260 (conversion to total PCB congener conc see pg. 39)	N	10
	MEAN	51.54
	STD	11.45

[*] All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.*

LAKE ERIE, MIDDLE ISLAND

HERRING GULL		YEAR													
		74	75	77	78	79	80	81	82	83	84	85	86	87	88
PERCENT LIPID IN EGG	N	10	10	10	10	10	10	10	10	10	10	10	1	10	1
	MEAN	8.49	8.44	9	8.8	8.12	7.07	8.64	7.94	7.77	9.12	9.04	7.7	8.72	7.3
	STD	0.853	.8488	1.076	1.143	1.057	.9945	.8631	1.303	.5293	1.209	.8733		1.214	
ARSENIC	N			1											
	MEAN			0.015											
	STD														
CADMIUM	N			1											
	MEAN			0.011											
	STD														
ALPHA-CHLORDANE	N			10		10	10	10	10	10	10	10	1	10	1
	MEAN			0.026		0.162	0.08	0.239	0.023	0.013	0.016	.0155	0.016	.0107	.0214
	STD			.0117		0.041	.0236	.0755	.0082	.0048	0.007	.0076		.0025	
GAMMA-CHLORDANE	N							7	10	10	10	10		10	1
	MEAN							.0516	0.012	0.003	.0125	0.005		.0014	.0013
	STD							.0356	.0042	.0011	.0134	0		.0003	
OXY-CHLORDANE	N			10	10	10	10	10	10	10	10	10	1	10	1
	MEAN			.2170	0.105	0.12	0.118	0.098	0.153	0.133	0.171	0.152	0.172	.0962	.1275
	STD			.1129	.0517	.0682	.0391	.0301	.0631	.0512	.0615	.0385		.0561	
123-CHLOROBENZENE	N					10									
	MEAN					.0022									
	STD					.0033									
124-CHLOROBENZENE	N					10									
	MEAN					.0063									
	STD					.0037									
135-CHLOROBENZENE	N					10									
	MEAN					0.001									
	STD					0									

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.*

LAKE ERIE, MIDDLE ISLAND

HERRING GULL		YEAR													
		74	75	77	78	79	80	81	82	83	84	85	86	87	88
1234-CHLOROBENZENE	N					10	10	10	10	10	10	10		10	1
	MEAN					.0053	.0008	.0015	.0025	.0007	.0005	.0027		.0202	.0175
	STD					.0031	.0008	.0024	.0018	.0005	0	.0071		.0027	
1235-/ 1245-CHLOROBENZENE	N					10	10	10	10	10	10	10		10	1
	MEAN					.0117	.0014	0.002	.0037	0.001	.0018	.0014		.0307	.0237
	STD					.0066	.0027	.0032	.0025	.0011	0.002	.0018		.0034	
PENTA-CHLOROBENZENE	N					10	10	10	10	10	10	10		10	1
	MEAN					.0141	0.008	.0093	.0074	.0046	.0051	.0056		.0098	.0103
	STD					.0032	.0016	.0022	.0025	.0012	.0015	.0028		.0001	
HEXA-CHLOROBENZENE	N	10	10	10	10	10	10	10	10	10	10	10	1	10	1
	MEAN	.3762	.2261	.1940	0.091	0.123	.0877	.0998	.0789	.0457	.0609	.0661	0.059	.0353	.0638
	STD	.1171	.0928	.0648	.0303	.0211	.0187	.0201	.0238	.0089	.0201	.0126		.0091	
DDD	N	10	10	10		10	10	10	10	10	10	10	1	10	1
	MEAN	.1736	.0224	0.192		0.123	0.061	0.038	0.073	0.015	0.01	0.028	0.019	.0112	.0164
	STD	.0667	.0171	.0665		.0353	.0129	.0175	0.062	.0053	0	.0079		.0029	
DDE	N	10	10	10	10	10	10	10	10	10	10	10	1	10	1
	MEAN	5.551	6.902	7.419	2.977	2.763	2.603	3.064	2.628	1.663	2.026	2.038	2.32	1.696	2.206
	STD	1.646	1.703	2.184	1.006	.5935	0.655	.9306	1.033	.8547	1.034	.5713		.4739	
DDT	N	10	10	10	10	10	10	10	10	10	10	10	1	10	1
	MEAN	.3154	0.095	0.050	0.052	0.026	0.098	0.044	0.027	.0075	0.01	0.023	0.016	.0162	.0158
	STD	.1652	.0652	.0267	.0333	.0097	.0843	.0237	.0125	.0026	.0075	.0106		.0055	
DIELDRIN	N	10	10	10	10	10	10	10	10	10	10	10	1	10	1
	MEAN	0.339	0.275	0.306	0.21	0.265	0.156	0.197	0.24	0.235	0.316	0.22	0.256	.1435	.1654
	STD	0.138	.1705	.0858	.0648	.1078	.0558	.0506	.1185	.0472	.2715	.0613		.1072	
2378-TETRACHLORO-DIBENZO-P-DIOXIN	N							1	1	1	1	1	1	1	1
	MEAN							25	20	9	12	15	16	21	12
	STD														

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.*

LAKE ERIE, MIDDLE ISLAND

HERRING GULL		YEAR													
		74	75	77	78	79	80	81	82	83	84	85	86	87	88
12378-PENTACHLORO-DIBENZO-P-DIOXIN	N							1	1	1	1	1	1		1
	MEAN							16	10	10	12	14	14		8
	STD														
123678-HEXACHLORO-DIBENZO-P-DIOXIN	N							1	1	1	1	1	1	1	1
	MEAN							22	13	14	18	19	22	13	7
	STD														
1234678-HEPTACHLORO-DIBENZO-P-DIOXIN	N										1	1	1		1
	MEAN										5	6	6		3
	STD														
OCTACHLORO-DIBENZO-P-DIOXIN	N							1	1	1	1	1	1	1	1
	MEAN							20	10	10	13	10	10	10	3
	STD														
2378-TETRACHLORO-DIBENZOFURAN	N										1	1	1	1	1
	MEAN										3	2	2	2	1
	STD														
23478-PENTACHLORO-DIBENZOFURAN	N										1	1	1		1
	MEAN										10	10	9		5
	STD														
123478-/ 123467-HEXACHLORO-DIBENZOFURAN	N										1	1	1	1	1
	MEAN										9	4	ND	4	ND
	STD														
123678-HEXACHLORO-DIBENZOFURAN	N										1	1	1	1	1
	MEAN										10	ND	4	4	ND
	STD														
HEPTACHLOR EPOXIDE	N	10	10	10	10	10	10	9	10	10	10	10	1	10	1
	MEAN	0.164	0.11	0.152	0.089	0.11	0.14	.1122	0.112	0.147	0.113	0.104	0.143	.0768	.1142
	STD	.0448	.0485	.0333	.0137	.0245	.0362	.0299	.0454	.0386	.0263	.0165		.0143	

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.*

LAKE ERIE, MIDDLE ISLAND

HERRING GULL		YEAR													
		74	75	77	78	79	80	81	82	83	84	85	86	87	88
ALPHA-HEXACHLORO-CYCLOHEXANE	N									10	10	10		10	1
	MEAN									0.007	.0025	.0047		.0021	.0026
	STD									.0026	0	.0008		.0003	
BETA-HEXACHLORO-CYCLOHEXANE	N			10	10	10	10	10	10	10	10	10	1	10	1
	MEAN			0.036	.0095	0.01	.0029	0.016	.0106	.0095	.0025	0.005	.0005	.0031	.0032
	STD			.0207	.0044	0	0.004	0.007	.0059	.0016	0	0		0	
GAMMA-HEXACHLORO-CYCLOHEXANE	N													10	1
	MEAN													0.002	.0024
	STD													.0002	
LEAD	N			1											
	MEAN			0.55											
	STD														
TOTAL MERCURY	N	10	10					10	10	10		10			
	MEAN	0.223	0.214					0.165	0.211	0.134		0.156			
	STD	.0648	.0769					.0255	.0418	0.028		.0324			
MIREX	N	10	10	10	10	10	10	10	10	10	10	10	1	10	1
	MEAN	0.436	0.223	0.39	.0192	0.104	0.093	0.073	0.079	0.043	0.05	0.052	0.03	.0142	.0258
	STD	.4288	.0627	.3441	.0495	.0409	.0794	.0732	.0363	.0406	.0447	.0215		.0056	
PHOTOMIREX	N			10	10	10							1	10	1
	MEAN			0.139	0.001	0.047							.0005	.0163	.0107
	STD			.1224	.0014	.0221								.0028	
CIS-NONACHLOR	N												1	10	1
	MEAN												0.056	.0338	.0519
	STD													.0087	
TRANS-NONACHLOR	N								10	10	10	10	1	10	1
	MEAN								0.041	0.012	0.016	.0135	0.09	.0599	.0684
	STD								0.026	.0042	.0052	.0075		.0263	

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.*

LAKE ERIE, MIDDLE ISLAND

HERRING GULL		YEAR													
		74	75	77	78	79	80	81	82	83	84	85	86	87	88
OCTACHLORO-STYRENE	N													10	1
	MEAN													.0299	.0425
	STD													.0095	
PCB 1260	N	10	10	10	10	10	10	10	10	10	10		1	10	1
	MEAN	55.04	54.4	69.51	34.38	53.45	47.65	61.56	50.39	30.91	40.41		22.7	15.85	17.2
	STD	10.49	10.3	23.73	9.215	11.54	10.62	14.59	20.86	13.44	13.4			4.456	
PCB 1254:1260 (conversion to total PCB congener conc see pg. 39)	N	10	10	10	10	10	10	10	10	10	10	10	1	10	1
	MEAN	72.36	70.69	78.13	42.43	59.28	54.29	68.61	58.81	37.92	47.26	47.15	43	27.88	37.4
	STD	13.79	13.37	23.96	11.31	12.77	11.56	15.74	23.88	15.41	15.85	10.46		6.278	
SELENIUM	N			1											
	MEAN			1											
	STD														

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.*

LAKE ERIE, MIDDLE ISLAND

BLACK-CROWNED NIGHT-HERON		YEAR	
		82	86
PERCENT LIPID IN EGG	N	10	1
	MEAN	5.67	5.1
	STD	1.076	
ALPHA-CHLORDANE	N	10	1
	MEAN	.0135	0.01
	STD	.0137	
GAMMA-CHLORDANE	N	10	
	MEAN	.0048	
	STD	.0036	
OXY-CHLORDANE	N	10	1
	MEAN	0.123	0.035
	STD	.1141	
1234-CHLOROBENZENE	N	10	
	MEAN	.0003	
	STD	0	
1235-/ 1245-CHLOROBENZENE	N	10	
	MEAN	.0003	
	STD	0	
PENTA-CHLOROBENZENE	N	10	
	MEAN	.0007	
	STD	.0012	
HEXA-CHLOROBENZENE	N	10	1
	MEAN	.0278	0.006
	STD	.0169	
DDD	N	10	1
	MEAN	0.054	0.016
	STD	.0135	

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.[*]

LAKE ERIE, MIDDLE ISLAND

BLACK-CROWNED NIGHT-HERON		YEAR	
		82	86
DDE	N	10	1
	MEAN	1.736	0.763
	STD	.8802	
DDT	N	10	1
	MEAN	.0025	.0005
	STD	0	
DIELDRIN	N	10	1
	MEAN	0.111	0.034
	STD	.0901	
HEPTACHLOR EPOXIDE	N	10	1
	MEAN	0.039	0.021
	STD	.0208	
ALPHA-HEXACHLORO-CYCLOHEXANE	N	10	
	MEAN	.0025	
	STD		
BETA-HEXACHLORO-CYCLOHEXANE	N	10	1
	MEAN	.0043	.0005
	STD	.0055	
MIREX	N	10	1
	MEAN	0.028	0.011
	STD	.0114	
PHOTOMIREX	N		1
	MEAN		.0005
	STD		
CIS-NONACHLOR	N		1
	MEAN		0.031
	STD		

---

[*] All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.*

LAKE ERIE, MIDDLE ISLAND

BLACK-CROWNED NIGHT-HERON		YEAR	
		82	86
TRANS-NONACHLOR	N	10	1
	MEAN	0.068	0.069
	STD	.0494	
PCB 1260	N	10	1
	MEAN	25.05	7.9
	STD	10.87	
PCB 1254:1260 (conversion to total PCB congener conc see pg. 39)	N	10	1
	MEAN	28.71	13.2
	STD	12.64	

---

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.[*]

LAKE ERIE, BIG CHICKEN ISLAND

DOUBLE-CRESTED CORMORANT		YEAR			
		72	79	81	83
PERCENT LIPID IN EGG	N	18	10	10	1
	MEAN	8.261	4.15	4.06	4.7
	STD	1.752	.2635	.6467	
ALPHA-CHLORDANE	N		10		1
	MEAN		.0425		0.01
	STD		.0408		
GAMMA-CHLORDANE	N				1
	MEAN				0.005
	STD				
OXY-CHLORDANE	N		9		1
	MEAN		.0656		0.09
	STD		.0296		
1234-CHLOROBENZENE	N			10	1
	MEAN			.0005	.0005
	STD			0	
PENTA-CHLOROBENZENE	N			10	1
	MEAN			.0024	0.005
	STD			.0021	
1235-/ 1245-CHLOROBENZENE	N			10	1
	MEAN			.0005	.0005
	STD			0	
HEXA-CHLOROBENZENE	N	18	10	10	1
	MEAN	.0067	0.054	.0371	0.031
	STD	.0024	.0276	.0146	
DDD	N	18	10		1
	MEAN	.0873	0.213		0.01
	STD	.0784	.1474		

[*] All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.*

LAKE ERIE, BIG CHICKEN ISLAND

DOUBLE-CRESTED CORMORANT		YEAR			
		72	79	81	83
DDE	N	18	10	10	1
	MEAN	6.364	4.516	3.593	2.69
	STD	4.618	2.325	3.09	
DDT	N	18	10		1
	MEAN	.0710	0.046		0.005
	STD	.0477	.0622		
DIELDRIN	N	18	10		1
	MEAN	.2328	0.261		0.25
	STD	.1399	.1622		
HEPTACHLOR EPOXIDE	N	18	10		1
	MEAN	.0222	0.091		0.05
	STD	.0081	0.089		
ALPHA-HEXACHLORO-CYCLOHEXANE	N				1
	MEAN				0.02
	STD				
BETA-HEXACHLORO-CYCLOHEXANE	N		10		1
	MEAN		0.015		0.01
	STD		.0133		
TOTAL MERCURY	N	18			
	MEAN	.4489			
	STD	.1314			
MIREX	N		10	10	1
	MEAN		0.105	0.049	0.05
	STD		.0913	.0311	
PHOTOMIREX	N		10		
	MEAN		.0315		
	STD		.0263		

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.[*]

LAKE ERIE, BIG CHICKEN ISLAND

DOUBLE-CRESTED CORMORANT		YEAR			
		72	79	81	83
TRANS-NONACHLOR	N				1
	MEAN				0.01
	STD				
PCB 1260	N	18	10	10	1
	MEAN	18.81	35.52	33.8	29.3
	STD	12.25	18.81	9.674	
PCB 1254:1260 (conversion to total PCB congener conc see pg. 39)	N		10	10	1
	MEAN		45.49	38.66	36.6
	STD		24.12	10.78	

---

[*] All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.[*]

LAKE ERIE, MIDDLE SISTER ISLAND

HERRING GULL		YEAR
		78
PERCENT LIPID IN EGG	N	44
	MEAN	9.186
	STD	.9790
OXY-CHLORDANE	N	44
	MEAN	.1341
	STD	.0601
HEXA-CHLOROBENZENE	N	44
	MEAN	.2523
	STD	0.063
DDE	N	44
	MEAN	5.279
	STD	1.472
DDT	N	44
	MEAN	.0473
	STD	.0336
DIELDRIN	N	44
	MEAN	.2170
	STD	0.075
HEPTACHLOR EPOXIDE	N	44
	MEAN	.0941
	STD	.0303
BETA-HEXACHLORO-CYCLOHEXANE	N	44
	MEAN	.0107
	STD	.0048
MIREX	N	44
	MEAN	.1198
	STD	.1037

[*] All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.[*]

LAKE ERIE, MIDDLE SISTER ISLAND

HERRING GULL		YEAR
		78
PHOTOMIREX	N	44
	MEAN	.0458
	STD	.0417
PCB 1260	N	44
	MEAN	56.85
	STD	14.54
PCB 1254:1260 (conversion to total PCB congener conc see pg. 39)	N	44
	MEAN	67.19
	STD	15.74

---

[*] All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.[*]

DETROIT RIVER, FIGHTING ISLAND

HERRING GULL		YEAR										
		72	78	79	81	82	83	84	85	86	87	88
PERCENT LIPID IN EGG	N	2	11	45	10	20	11	10	10	1	10	1
	MEAN	13.5	8.327	9.04	8.13	8.6	8.109	9.05	8.56	6.7	8.01	7.6
	STD	.7071	.8912	.7608	.8807	1.403	.7842	.7561	1.376		.9515	
ALPHA-CHLORDANE	N			10	10	20	11	10	10	1	10	1
	MEAN			0.105	0.28	0.024	.0145	0.017	.0105	0.008	.0076	.0174
	STD			.0299	.1743	.0182	.0069	.0048	.0072		.0036	
GAMMA-CHLORDANE	N				7	20	11	10	10		10	1
	MEAN				.1258	0.009	.0025	.0275	.0052		.0017	.0013
	STD				.1159	.0025	0	0.026	.0018		0	
OXY-CHLORDANE	N		11	44	10	20	11	10	10	1	10	1
	MEAN		.1964	0.162	0.123	.1695	.1773	0.209	0.124	0.09	.1081	.1087
	STD		.1082	0.103	.0313	.0926	.0694	.0667	.0696		.0456	
123-CHLOROBENZENE	N			10								
	MEAN			.0087								
	STD			.0048								
124-CHLOROBENZENE	N			10								
	MEAN			.0087								
	STD			.0038								
135-CHLOROBENZENE	N			10								
	MEAN			0.001								
	STD			0								
1234-CHLOROBENZENE	N			10	10	20	11	10	10		10	1
	MEAN			.0142	.0047	.0128	.0161	.0059	.0032		.0176	.0175
	STD			.0055	.0055	.0073	.0183	.0014	.0019		0	
1235-/ 1245-CHLOROBENZENE	N			10	10	20	11	10	10		10	1
	MEAN			.0103	.0005	.0069	.0062	.0057	.0029		.0271	.0237
	STD			.0041	0	.0043	.0023	.0013	.0025		.0008	

[*] All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.*

DETROIT RIVER, FIGHTING ISLAND

HERRING GULL		YEAR										
		72	78	79	81	82	83	84	85	86	87	88
PENTA-CHLOROBENZENE	N			10	10	20	11	10	10		10	1
	MEAN			.0741	0.027	.0224	.0162	.0266	.0111		.0098	.0103
	STD			.0276	.0081	.0069	0.008	.0101	.0039		.0002	
HEXA-CHLOROBENZENE	N	2	11	45	10	20	11	10	10	1	10	1
	MEAN	0.31	.2809	.3716	0.248	.1317	.1251	.2097	.0972	0.059	.0576	0.094
	STD	.0283	.0574	.0899	.0683	.0605	.0362	.0379	.0313		.0174	
DDD	N	2		45	10	20	11	10	10	1	10	1
	MEAN	0.08		.1351	0.086	.0765	.0218	0.024	0.017	0.012	0.017	0.015
	STD			0.082	0.042	.0559	0.006	.0151	.0067		.0129	
DDE	N	2	11	45	10	20	11	10	10	1	10	1
	MEAN	48.1	9.438	6.817	5.422	3.792	3.162	3.453	3.47	2.37	2.236	3.184
	STD	34.51	2.513	1.868	1.573	1.098	.8937	1.28	2.229		.8358	
DDT	N	2	11	45	10	20	11	10	10	1	10	1
	MEAN	.2682	.0936	.0458	0.064	.0335	.0089	.0065	0.018	0.014	.0165	.0221
	STD	0	.0378	.0171	.0267	0.025	.0026	.0024	.0092		.0074	
DIELDRIN	N	2	11	45	10	20	11	10	10	1	10	1
	MEAN	0.27	.1818	.1638	0.2	0.222	.2018	0.231	0.153	0.085	.0911	0.152
	STD	.1131	.0649	.0829	.1224	.1511	.0984	0.054	.0867		.0317	
2378-TETRACHLORO-DIBENZO-P-DIOXIN	N				1	1	1	1	1	1	1	1
	MEAN				49	35	26	33	23	16	14	20
	STD											
12378-PENTACHLORO-DIBENZO-P-DIOXIN	N				1	1	1	1	1	1	1	1
	MEAN				28	17	9	15	10	8	5	10
	STD											
123678-HEXACHLORO-DIBENZO-P-DIOXIN	N				1	1	1	1	1	1	1	1
	MEAN				65	24	23	31	18	18	13	20
	STD											

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.[*]

DETROIT RIVER, FIGHTING ISLAND

HERRING GULL		YEAR										
		72	78	79	81	82	83	84	85	86	87	88
1234678-HEPTACHLORO-DIBENZO-P-DIOXIN	N				1	1	1	1	1	1		1
	MEAN				ND	ND	ND	5	6	7		5
	STD											
OCTACHLORO-DIBENZO-P-DIOXIN	N				1		1	1	1	1	1	1
	MEAN				21		ND	16	10	10	10	8
	STD											
2378-TETRACHLORO-DIBENZOFURAN	N							1	1	1	1	1
	MEAN							3	ND	ND	ND	1
	STD											
23478-PENTACHLORO-DIBENZOFURAN	N							1	1	1	1	1
	MEAN							22	8	7	5	7
	STD											
123478-/123467-HEXACHLORO-DIBENZOFURAN	N							1	1	1	1	1
	MEAN							9	4	ND	ND	ND
	STD											
123673-HEXACHLORO-DIBENZOFURAN	N							1	1	1	1	1
	MEAN							9	4	ND	ND	ND
	STD											
HEPTACHLOR EPOXIDE	N	2	11	37	6	20	11	10	10	1	10	1
	MEAN	0.08	.0955	0.077	0.09	0.093	.0791	0.096	0.061	0.07	.0545	.1053
	STD	.0141	.0398	.0225	.0261	.0303	.0266	.0241	.0202		.0213	
ALPHA-HEXACHLORO-CYCLOHEXANE	N					10	11	10	10		10	1
	MEAN					.0043	.0048	.0025	.0033		.0025	.0026
	STD					.0031	.0028	0	.0012		0	
BETA-HEXACHLORO-CYCLOHEXANE	N		11	45	10	20	11	10	10	1	10	1
	MEAN		.0145	.0098	0.016	.0435	.0093	.0128	.0053	.0005	.0031	.0032
	STD		.0117	.0014	.0084	.0268	.0045	.0094	.0018		0	

[*] All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.*

DETROIT RIVER, FIGHTING ISLAND

HERRING GULL		YEAR										
		72	78	79	81	82	83	84	85	86	87	88
GAMMA-HEXACHLORO-CYCLOHEXANE	N										10	1
	MEAN										.0022	.0024
	STD										0	
TOTAL MERCURY	N	2			10	20	11		10			
	MEAN	0.58			0.21	.2375	.2255		0.165			
	STD	.1131			0.093	0.1	0.065		.0793			
MIREX	N		11	10	10	20	11	10	10	1	10	1
	MEAN		.1273	0.115	0.12	.1305	.2173	0.233	0.373	0.11	.0411	.0386
	STD		.1076	.0606	.1043	.0826	.3862	.4339	.5495		.0357	
PHOTOMIREX	N		11	10						1	10	1
	MEAN		0.02	0.039						.0005	.0189	.0107
	STD		.0268	.0173							0.001	
CIS-NONACHLOR	N									1	10	1
	MEAN									0.024	.0229	.0424
	STD										0.007	
TRANS-NONACHLOR	N					20	11	10	10	1	10	1
	MEAN					0.043	.0123	0.011	0.008	0.016	0.046	.0895
	STD					.0234	.0065	.0032	.0026		.0145	
OCTACHLORO-STYRENE	N										10	1
	MEAN										.0552	.0766
	STD										.0207	
PCB 1260	N	2	11	45	10	20	11	10		1	10	1
	MEAN	137	95.53	114.9	101.6	60.89	56.84	72.07		24.9	18.3	33.59
	STD	22.63	27.41	37.02	30.61	20.14	15.93	17.81			5.015	
PCB 1254:1260 (conversion to total PCB congener conc see pg. 39)	N		11	45	10	20	11	10	10	1	10	1
	MEAN		115.1	133.7	111	69.86	65.36	84.79	48.17	41.3	33.77	60.56
	STD		33.45	43.55	33.36	23.24	18	21.19	17.06		9.012	

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.[*]

DETROIT RIVER, FIGHTING ISLAND

COMMON TERN		YEAR	
		72	79
PERCENT LIPID IN EGG	N	3	10
	MEAN	15.07	10.08
	STD	7.574	1.333
ALPHA-CHLORDANE	N		3
	MEAN		.0267
	STD		.0115
OXY-CHLORDANE	N		10
	MEAN		0.019
	STD		.0057
HEXA-CHLOROBENZENE	N	3	10
	MEAN	0.06	0.141
	STD	0.01	.0484
DDD	N	3	10
	MEAN	.0868	0.118
	STD	.0806	.0559
DDE	N	3	10
	MEAN	5.963	1.614
	STD	2.421	.4212
DDT	N	3	10
	MEAN	.1676	0.018
	STD	.2243	.0103
DIELDRIN	N	3	10
	MEAN	.2267	0.093
	STD	0.194	.0343
HEPTACHLOR EPOXIDE	N	3	10
	MEAN	.0533	0.02
	STD	.0586	.0067

---

[*] All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.'

DETROIT RIVER, FIGHTING ISLAND

COMMON TERN		YEAR	
		72	79
BETA-HEXACHLORO-CYCLOHEXANE	N		10
	MEAN		.0043
	STD		.0049
TOTAL MERCURY	N	3	
	MEAN	.9733	
	STD	1.053	
MIREX	N		10
	MEAN		.0143
	STD		.0181
PHOTOMIREX	N		10
	MEAN		.0043
	STD		.0049
PCB 1260	N	3	10
	MEAN	34.17	30.67
	STD	4.051	5.794
PCB 1254:1260 (conversion to total PCB congener conc see pg. 39)	N		10
	MEAN		38.56
	STD		7.748

'All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.[1]

DETROIT RIVER, FIGHTING ISLAND

RING-BILLED GULL		YEAR	
		79	84
PERCENT LIPID IN EGG	N	10	10
	MEAN	9.52	8.93
	STD	1.136	.3057
ALPHA-CHLORDANE	N	2	10
	MEAN	0.04	0.02
	STD	.0424	.0067
GAMMA-CHLORDANE	N		10
	MEAN		.0045
	STD		.0011
OXY-CHLORDANE	N	6	10
	MEAN	.0317	0.062
	STD	.0098	.0266
1234-CHLOROBENZENE	N		10
	MEAN		.0007
	STD		.0006
1235-/ 1245-CHLOROBENZENE	N		10
	MEAN		.0007
	STD		.0006
PENTA-CHLOROBENZENE	N		10
	MEAN		.0049
	STD		.0027
HEXA-CHLOROBENZENE	N	10	10
	MEAN	0.095	.0327
	STD	.0337	.0164
DDD	N	10	10
	MEAN	0.055	.0105
	STD	.0284	.0037

---

[1] All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.[*]

DETROIT RIVER, FIGHTING ISLAND

RING-BILLED GULL		YEAR	
		79	84
DDE	N	10	10
	MEAN	2.093	1.081
	STD	.8744	.4933
DDT	N	10	10
	MEAN	.0281	.0203
	STD	.0174	.0233
DIELDRIN	N	10	10
	MEAN	0.355	0.276
	STD	.1697	.1423
HEPTACHLOR EPOXIDE	N	10	10
	MEAN	0.06	0.061
	STD	.0205	.0202
ALPHA-HEXACHLORO-CYCLOHEXANE	N		10
	MEAN		0.003
	STD		.0011
BETA-HEXACHLORO-CYCLOHEXANE	N	10	10
	MEAN	.0076	.0037
	STD	.0041	.0013
MIREX	N	10	10
	MEAN	.0054	.0415
	STD	.0106	.0684
PHOTOMIREX	N	10	
	MEAN	.0024	
	STD	0.004	
TRANS-NONACHLOR	N		10
	MEAN		0.016
	STD		0.007

[*] All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.[a]

DETROIT RIVER, FIGHTING ISLAND

RING-BILLED GULL		YEAR	
		79	84
PCB 1260	N	10	10
	MEAN	19.91	8.797
	STD	6.639	3.915
PCB 1254:1260 (conversion to total PCB congener conc see pg. 39)	N	10	10
	MEAN	23.24	10.63
	STD	8.067	4.661

[a] All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.[*]

LAKE ST. CLAIR, WALPOLE ISLAND

BLACK-CROWNED NIGHT-HERON		YEAR
		86
PERCENT LIPID IN EGG	N	1
	MEAN	5.8
	STD	
ALPHA-CHLORDANE	N	1
	MEAN	0.012
	STD	
OXY-CHLORDANE	N	1
	MEAN	0.057
	STD	
HEXA-CHLOROBENZENE	N	1
	MEAN	0.01
	STD	
DDD	N	1
	MEAN	0.008
	STD	
DDE	N	1
	MEAN	1.79
	STD	
DDT	N	1
	MEAN	0.007
	STD	
DIELDRIN	N	1
	MEAN	0.067
	STD	
HEPTACHLOR EPOXIDE	N	1
	MEAN	0.023
	STD	

---

[*] All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.*

LAKE ST. CLAIR, WALPOLE ISLAND

BLACK-CROWNED NIGHT-HERON		YEAR
		86
BETA-HEXACHLORO-CYCLOHEXANE	N MEAN STD	1 .0005
MIREX	N MEAN STD	1 0.114
PHOTOMIREX	N MEAN STD	1 0.043
CIS-NONACHLOR	N MEAN STD	1 0.074
TRANS-NONACHLOR	N MEAN STD	1 0.18
PCB 1260	N MEAN STD	1 4.37
PCB 1254:1260 (conversion to total PCB congener conc see pg. 39)	N MEAN STD	1 8.7

---

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.[a]

LAKE ST. CLAIR, WALPOLE ISLAND

FORSTERS TERN		YEAR
		86
PERCENT LIPID IN EGG	N	1
	MEAN	7.9
	STD	
ALPHA-CHLORDANE	N	1
	MEAN	0.028
	STD	
OXY-CHLORDANE	N	1
	MEAN	0.044
	STD	
HEXA-CHLOROBENZENE	N	1
	MEAN	0.044
	STD	
DDD	N	1
	MEAN	0.008
	STD	
DDE	N	1
	MEAN	1.47
	STD	
DDT	N	1
	MEAN	0.052
	STD	
DIELDRIN	N	1
	MEAN	0.133
	STD	
HEPTACHLOR EPOXIDE	N	1
	MEAN	0.044
	STD	

[a] All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.[*]

LAKE ST. CLAIR, WALPOLE ISLAND

FORSTERS TERN		YEAR
		86
BETA-HEXACHLORO-CYCLOHEXANE	N	1
	MEAN	.0005
	STD	
MIREX	N	1
	MEAN	0.037
	STD	
PHOTOMIREX	N	1
	MEAN	0.009
	STD	
CIS-NONACHLOR	N	1
	MEAN	0.071
	STD	
TRANS-NONACHLOR	N	1
	MEAN	0.243
	STD	
PCB 1260	N	1
	MEAN	5.53
	STD	
PCB 1254:1260 (conversion to total PCB congener conc see pg. 39)	N	1
	MEAN	12.8
	STD	

[*] All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.[*]

ST. CLAIR RIVER

HERRING GULL		YEAR
		87
PERCENT LIPID IN EGG	N	1
	MEAN	9.1
	STD	
ALPHA-CHLORDANE	N	1
	MEAN	.0132
	STD	
GAMMA-CHLORDANE	N	1
	MEAN	.0016
	STD	
OXY-CHLORDANE	N	1
	MEAN	.1385
	STD	
1234-CHLOROBENZENE	N	1
	MEAN	.0176
	STD	
1235-/ 1245-CHLOROBENZENE	N	1
	MEAN	.0266
	STD	
PENTA-CHLOROBENZENE	N	1
	MEAN	.0363
	STD	
HEXA-CHLOROBENZENE	N	1
	MEAN	.1078
	STD	
DDD	N	1
	MEAN	.0143
	STD	

[*] All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.[*]

ST. CLAIR RIVER

HERRING GULL		YEAR
		87
DDE	N	1
	MEAN	2.409
	STD	
DDT	N	1
	MEAN	.0444
	STD	
DIELDRIN	N	1
	MEAN	.1737
	STD	
HEPTACHLOR EPOXIDE	N	1
	MEAN	.0904
	STD	
ALPHA-HEXACHLOROCYCLOHEXANE	N	1
	MEAN	.0025
	STD	
BETA-HEXACHLOROCYCLOHEXANE	N	1
	MEAN	.0031
	STD	
GAMMA-HEXACHLOROCYCLOHEXANE	N	1
	MEAN	.0021
	STD	
MIREX	N	1
	MEAN	.0249
	STD	
PHOTOMIREX	N	1
	MEAN	.0177
	STD	

---

[*] All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.*

ST. CLAIR RIVER

HERRING GULL		YEAR
		87
CIS-NONACHLOR	N	1
	MEAN	.0408
	STD	
TRANS-NONACHLOR	N	1
	MEAN	.0649
	STD	
OCTACHLORO-STYRENE	N	1
	MEAN	.0931
	STD	
PCB 1260	N	1
	MEAN	12.68
	STD	
PCB 1254:1260 (conversion to total PCB congener conc see pg. 39)	N	1
	MEAN	26.24
	STD	

---

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.[*]

LAKE HURON, CHANTRY ISLAND

HERRING GULL		YEAR													
		74	75	77	78	79	80	81	82	83	84	85	86	87	88
PERCENT LIPID IN EGG	N	10	10	10	15	10	10	10	10	11	10	10	1	1	13
	MEAN	8.15	8.61	9.44	10.2	7.72	9.42	9.23	8.22	8.027	8.82	9.04	8	9	8.662
	STD	1.052	.8157	.8113	1.664	.8108	.7146	1.451	.9589	.7656	.5633	.7516			.3641
ARSENIC	N			1											
	MEAN			0.015											
	STD														
CADMIUM	N			1											
	MEAN			0.015											
	STD														
ALPHA-CHLORDANE	N			10	5	10	10	10	3	11	10	10	1	1	13
	MEAN			0.061	0.14	0.087	0.084	0.187	.0167	0.005	0.01	0.012	0.012	.0016	.0174
	STD			.0354	0.098	.0291	.0255	.0678	.0115	.0034	.0041	.0059			.0093
GAMMA-CHLORDANE	N							10	10	11	10	10		1	13
	MEAN							.0571	.0105	.0034	.0125	.0045		.0017	.0008
	STD							.0297	.0037	.0023	0.013	.0011			.0008
OXY-CHLORDANE	N			10	15	10	10	10	10	11	10	10	1	1	13
	MEAN			0.295	.1753	0.117	0.097	0.15	0.263	.1764	0.132	0.166	0.182	.0803	.1269
	STD			.1112	.0838	.0638	.0291	.0485	.1264	.0465	.0471	.0779			.1734
123-CHLOROBENZENE	N					10									
	MEAN					.0037									
	STD					.0032									
124-CHLOROBENZENE	N					10									
	MEAN					.0122									
	STD					.0079									
135-CHLOROBENZENE	N					10									
	MEAN					0.001									
	STD					0									

---

[*] All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.*

LAKE HURON, CHANTRY ISLAND

HERRING GULL		YEAR													
		74	75	77	78	79	80	81	82	83	84	85	86	87	88
1234-CHLOROBENZENE	N					10	10	10	10	11	10	10		1	13
	MEAN					.0061	.0014	.0006	.0034	.0015	.0037	.0038		.0176	.0035
	STD					.0048	.0019	.0002	0.003	.0023	.0078	.0066			0
1235-/ 1245-CHLOROBENZENE	N					10	10	10	10	11	10	10		1	13
	MEAN					.0068	.0015	0.001	.0047	.0021	.0014	.0006		.0266	.0043
	STD					0.004	0.003	.0014	.0025	0.004	0.002	.0006			0.001
PENTA-CHLOROBENZENE	N					10	10	10	10	11	10	10		1	13
	MEAN					.0113	.0078	0.007	.0114	.0077	.0085	0.004		.0097	.0031
	STD					.0086	.0041	.0033	.0088	.0036	0.006	.0019			.0018
HEXA-CHLOROBENZENE	N	10	10	10	15	10	10	10	10	11	10	10	1	1	13
	MEAN	.4674	.1786	.1720	0.126	0.099	.0751	0.072	.0808	.0455	.0736	0.051	0.05	.0241	.0411
	STD	.2259	.0484	.0804	.0646	.0739	.0271	.0251	.0265	.0134	.0173	.0149			.0235
DDD	N	10	10	10	5	10	10	10	10	11	10	10	1	1	13
	MEAN	0.294	.0336	.2270	0.13	0.108	0.108	0.035	0.162	.0127	.0085	.0235	0.01	.0037	.0087
	STD	.0726	.0352	.0825	.1027	.0394	0.027	.0143	.0832	.0087	.0024	.0309			.0016
DDE	N	10	10	10	15	10	10	10	10	11	10	10	1	1	13
	MEAN	20.97	11.85	13.32	6.143	2.543	2.831	4.081	5.029	2.224	2.547	2.466	2	1.044	1.116
	STD	8.637	4.402	4.57	2.41	1.69	1.442	1.858	3.228	1.006	1.676	1.293			.6921
DDT	N	10	10	10	15	10	10	10	10	11	10	10	1	1	13
	MEAN	.6345	.1520	.0910	.0827	0.057	0.04	0.028	0.077	0.02	0.011	0.067	0.064	.0125	.0813
	STD	.2266	.1188	.0495	.0745	.0189	.0141	.0123	0.04	0.011	.0052	.0306			.0233
DIELDRIN	N	10	10	10	15	10	10	10	10	11	10	10	1	1	13
	MEAN	0.471	0.31	0.574	.2387	0.278	0.232	0.251	0.291	.1973	0.186	0.286	0.238	.1001	.2086
	STD	0.176	.1955	.2491	.1339	.0899	.0718	.0926	.2092	0.06	.0789	.0817			.0465
2378-TETRACHLORO-DIBENZO-P-DIOXIN	N							1	1	1	1	1	1	1	1
	MEAN							45	61	15	30	24	22	14	14
	STD														

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.*

LAKE HURON, CHANTRY ISLAND

HERRING GULL		YEAR													
		74	75	77	78	79	80	81	82	83	84	85	86	87	88
12378-PENTACHLORO-DIBENZO-P-DIOXIN	N							1	1	1	1	1	1	1	1
	MEAN							20	17	9	12	17	13	5	5
	STD														
123678-HEXACHLORO-DIBENZO-P-DIOXIN	N							1	1	1	1	1	1	1	1
	MEAN							26	17	12	14	12	11	5	4
	STD														
1234678-HEPTACHLORO-DIBENZO-P-DIOXIN	N							1	1	1	1	1	1	1	1
	MEAN							ND	8	8	5	6	6	6	2
	STD														
OCTACHLORO-DIBENZO-P-DIOXIN	N							1	1	1	1	1	1	1	1
	MEAN							10	11	12	12	10	10	ND	3
	STD														
2378-TETRACHLORO-DIBENZOFURAN	N										1	1	1	1	1
	MEAN										3	2	ND	ND	2
	STD														
23478-PENTACHLORO-DIBENZOFURAN	N										1	1	1	1	1
	MEAN										18	17	9	5	7
	STD														
123478-/123467-HEXACHLORO-DIBENZOFURAN	N										1	1	1	1	1
	MEAN										5	4	4	4	ND
	STD														
123678-HEXACHLORO-DIBENZOFURAN	N										1	1	1	1	1
	MEAN										6	4	4	4	ND
	STD														
HEPTACHLOR EPOXIDE	N	10	10	10	15	10	10	9	10	11	10	10	1	1	13
	MEAN	0.155	0.073	0.189	.1173	0.089	0.111	0.09	0.122	.1364	0.075	0.112	0.134	.0763	.0825
	STD	.0462	.0298	.0493	.0574	.0197	.0296	.0292	.0551	.0378	.0259	.0244			.0124

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.'

LAKE HURON, CHANTRY ISLAND

HERRING GULL		YEAR													
		74	75	77	78	79	80	81	82	83	84	85	86	87	88
ALPHA-HEXACHLOROCYCLOHEXANE	N									11	10	10		1	13
	MEAN									.0061	.0025	.0037		.0025	.0016
	STD									.0032	0	.0013			.0005
BETA-HEXACHLOROCYCLOHEXANE	N			10	15	10	10	10	10	11	10	10	1	1	13
	MEAN			0.037	0.026	0.014	0.01	0.015	.0073	.0139	.0043	.0047	.0005	.0031	.0038
	STD			.0254	.0216	.0126	.0041	.0053	.0104	.0126	.0055	.0008			.0027
GAMMA-HEXACHLOROCYCLOHEXANE	N													1	13
	MEAN													.0022	.0012
	STD														0
LEAD	N			1											
	MEAN			0.41											
	STD														
TOTAL MERCURY	N	10	10					9	10	11		10			
	MEAN	0.244	0.228					.1844	0.283	0.13		0.129			
	STD	0.067	.0769					.0799	0.085	.0707		.0509			
MIREX	N	10	10	10	15	10	10	10	10	10	10	10	1	1	13
	MEAN	2.155	0.478	0.332	.2427	0.201	0.159	0.352	0.581	0.156	0.492	0.141	0.128	.1114	.0657
	STD	2.056	.5647	0.216	.2844	0.326	.1617	.3667	.6309	.0789	.3776	.1347			.0722
PHOTOMIREX	N			10	15	10							1	1	13
	MEAN			0.141	0.1	0.085							0.058	.0177	.0278
	STD			.0781	.1025	.1271									.0333
CIS-NONACHLOR	N												1	1	13
	MEAN												0.057	.0241	.0462
	STD														.0104
TRANS-NONACHLOR	N								10	11	10	10	1	1	13
	MEAN								0.2	.0089	.0195	.0125	0.095	.0029	.0623
	STD								.0923	.0047	.0285	.0054			.0116

'All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.*

LAKE HURON, CHANTRY ISLAND

HERRING GULL		YEAR													
		74	75	77	78	79	80	81	82	83	84	85	86	87	88
OCTACHLORO-STYRENE	N													1	13
	MEAN													.0103	.0157
	STD														.0189
PCB 1260	N	10	10	10	15	10	10	10	10	11	10		1	1	13
	MEAN	64.54	30.29	53.12	32.32	27.37	20.71	24.89	33.22	14.05	18.1		5.06	3.692	3.999
	STD	16.26	13.11	14.08	13.05	18.44	12.59	8.876	30.02	2.849	8.299				6.578
PCB 1254:1260 (conversion to total PCB congener conc see pg. 39)	N	10	10	10	15	10	10	10	10	11	10	10	1	1	13
	MEAN	85.67	39.33	63.66	36.62	31.08	23.41	27.7	38.06	16.86	21.54	14.25	12.3	7.71	8.007
	STD	21.68	17.1	16.51	14.35	22.94	14.54	9.852	33.71	3.449	9.939	9.55			10.81
SELENIUM	N			1											
	MEAN			0.2											
	STD														

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.[1]

LAKE HURON, CHANTRY ISLAND

BLACK-CROWNED NIGHT-HERON		YEAR
		82
PERCENT LIPID IN EGG	N	1
	MEAN	6.3
	STD	
GAMMA-CHLORDANE	N	1
	MEAN	0.005
	STD	
OXY-CHLORDANE	N	1
	MEAN	0.15
	STD	
1234-CHLOROBENZENE	N	1
	MEAN	.0003
	STD	
1235-/ 1245-CHLOROBENZENE	N	1
	MEAN	.0003
	STD	
PENTA-CHLOROBENZENE	N	1
	MEAN	.0003
	STD	
HEXA-CHLOROBENZENE	N	1
	MEAN	0.035
	STD	
DDD	N	1
	MEAN	0.02
	STD	
DDE	N	1
	MEAN	3.96
	STD	

[1] All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.[*]

LAKE HURON, CHANTRY ISLAND

BLACK-CROWNED NIGHT-HERON		YEAR 82
DDT	N	1
	MEAN	0.03
	STD	
DIELDRIN	N	1
	MEAN	0.11
	STD	
HEPTACHLOR EPOXIDE	N	1
	MEAN	0.06
	STD	
ALPHA-HEXACHLORO-CYCLOHEXANE	N	1
	MEAN	.0025
	STD	
BETA-HEXACHLORO-CYCLOHEXANE	N	1
	MEAN	.0025
	STD	
MIREX	N	1
	MEAN	0.19
	STD	
TRANS-NONACHLOR	N	1
	MEAN	0.04
	STD	
PCB 1260	N	1
	MEAN	17.6
	STD	
PCB 1254:1260 (conversion to total PCB congener conc see pg. 39)	N	1
	MEAN	19.2
	STD	

---

[*] All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.[*]

LAKE HURON, KETTLE POINT

COMMON TERN		YEAR 72
PERCENT LIPID IN EGG	N	2
	MEAN	12.95
	STD	2.051
HEXA-CHLOROBENZENE	N	2
	MEAN	0.17
	STD	
DDD	N	2
	MEAN	0.045
	STD	.0495
DDE	N	2
	MEAN	5.635
	STD	.8697
DDT	N	2
	MEAN	.0279
	STD	.0237
DIELDRIN	N	2
	MEAN	0.2
	STD	.0141
HEPTACHLOR EPOXIDE	N	2
	MEAN	0.035
	STD	.0212
TOTAL MERCURY	N	2
	MEAN	0.36
	STD	.1414
PCB 1260	N	2
	MEAN	28.35
	STD	4.172

---

[*] All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.[*]

LAKE HURON, MANITOBA REEF

HERRING GULL		YEAR
		80
PERCENT LIPID IN EGG	N	10
	MEAN	8.3
	STD	.4761
1234-CHLOROBENZENE	N	10
	MEAN	.0756
	STD	.2348
1235-/ 1245-CHLOROBENZENE	N	10
	MEAN	0.003
	STD	.0058
PENTA-CHLOROBENZENE	N	10
	MEAN	.0949
	STD	.2889
HEXA-CHLOROBENZENE	N	10
	MEAN	.0973
	STD	.0748
DDE	N	10
	MEAN	6.38
	STD	3.881
MIREX	N	10
	MEAN	0.206
	STD	.2651
PCB 1260	N	10
	MEAN	39.57
	STD	37.95
PCB 1254:1260 (conversion to total PCB congener conc see pg. 39)	N	10
	MEAN	43.12
	STD	41.69

---

[*] All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.[*]

LAKE HURON, BLACK RIVER

HERRING GULL		YEAR 80
PERCENT LIPID IN EGG	N	10
	MEAN	7.92
	STD	.7036
1234-CHLOROBENZENE	N	10
	MEAN	.0169
	STD	.0325
1235-/ 1245-CHLOROBENZENE	N	10
	MEAN	.0066
	STD	0.013
PENTA-CHLOROBENZENE	N	10
	MEAN	.0134
	STD	.0157
HEXA-CHLOROBENZENE	N	10
	MEAN	.1127
	STD	.0422
DDE	N	10
	MEAN	5.831
	STD	2.718
MIREX	N	10
	MEAN	0.121
	STD	.1319
PCB 1260	N	10
	MEAN	26.91
	STD	10.55
PCB 1254:1260 (conversion to total PCB congener conc see pg. 39)	N	10
	MEAN	28.68
	STD	11.07

[*] All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.'

LAKE HURON, LITTLE CHARITY ISLAND

HERRING GULL		YEAR
		80
PERCENT LIPID IN EGG	N	10
	MEAN	7.83
	STD	.7134
1234-CHLOROBENZENE	N	10
	MEAN	.1242
	STD	.1827
1235-/ 1245-CHLOROBENZENE	N	10
	MEAN	.0485
	STD	.0419
PENTA-CHLOROBENZENE	N	10
	MEAN	.0327
	STD	0.026
HEXA-CHLOROBENZENE	N	10
	MEAN	.1316
	STD	.0449
DDE	N	10
	MEAN	6.442
	STD	1.712
MIREX	N	10
	MEAN	0.082
	STD	.0437
PCB 1260	N	10
	MEAN	40.88
	STD	12.54
PCB 1254:1260 (conversion to total PCB congener conc see pg. 39)	N	10
	MEAN	41.93
	STD	12.94

'All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.*

LAKE HURON, CHANNEL SHELTER ISLAND

HERRING GULL		YEAR								
		80	81	82	83	84	85	86	87	88
PERCENT LIPID IN EGG	N	10	10	10	11	10	10	1	1	16
	MEAN	8.85	7.24	9.04	8.655	9.35	8.83	7.9	9.5	9.131
	STD	.8086	.8099	1.221	.6006	.4403	.5272			1.148
ALPHA-CHLORDANE	N		10	10	11	10	10	1	1	16
	MEAN		0.161	0.024	.0109	0.013	0.017	0.02	.0118	.0127
	STD		.0674	.0117	0.003	.0048	.0095			.0056
GAMMA-CHLORDANE	N		2	8	11	10	10		1	16
	MEAN		.0452	.0363	.0032	.0075	0.005		.0016	.0012
	STD		.0633	.0185	.0012	.0026				0
OXY-CHLORDANE	N		10	10	11	10	10	1	1	16
	MEAN		0.121	0.244	.1445	0.162	0.137	0.152	.1321	.1418
	STD		.0407	.1871	.0383	.0692	.0544			.0627
1234-CHLOROBENZENE	N	10	10	10	11	10	10		1	16
	MEAN	.5717	1.749	.0005	0.788	.3859	.7291		.1151	.2828
	STD	.3366	.5595	0	.3802	0.096	.3036			.1242
1235-/ 1245-CHLOROBENZENE	N	10	10	10	11	10	10		1	16
	MEAN	.1762	.4532	.0005	.1392	.0757	.0775		.0266	.0567
	STD	.0831	.1222	0	.0755	.0216	.0371			.0285
PENTA-CHLOROBENZENE	N	10	10	10	11	10	10		1	16
	MEAN	.0876	.1775	.1197	.1568	.0726	.0685		.0293	.0431
	STD	.0422	0.052	.0485	.0755	.0219	0.029			.0256
HEXA-CHLOROBENZENE	N	10	10	10	11	10	10	1	1	16
	MEAN	.1935	.1367	.1719	.1375	.0873	.0871	0.074	.0672	0.08
	STD	.0554	.0215	0.05	.0633	.0258	.0228			.0243
DDD	N		9	9	11	10	10	1	1	16
	MEAN		.2211	.0833	.0318	0.023	0.068	0.031	.0378	.0351
	STD		.0501	.0367	.0218	.0106	.0225			.0238

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.[*]

LAKE HURON, CHANNEL SHELTER ISLAND

HERRING GULL		YEAR								
		80	81	82	83	84	85	86	87	88
DDE	N	10	10	10	11	10	10	1	1	16
	MEAN	8.899	7.297	8.099	6.059	5.41	4.808	5.95	4.002	4.548
	STD	3.77	2.052	2.915	1.942	2.062	1.367			1.725
DDT	N		10	10	11	10	10	1	1	16
	MEAN		0.049	0.039	0.01	.0095	0.041	0.038	.0197	.0402
	STD		.0213	.0173	.0039	.0044	.0191			.0272
DIELDRIN	N		10	10	11	10	10	1	1	16
	MEAN		0.175	0.315	.1573	0.229	0.207	0.177	.1922	.1856
	STD		.0814	.1697	.0559	.0964	0.075			0.076
2378-TETRACHLORO-DIBENZO-P-DIOXIN	N		1	1	1	1	1	1	1	1
	MEAN		155	214	141	99	87	88	137	86
	STD									
12378-PENTACHLORO-DIBENZO-P-DIOXIN	N		1	1	1	1	1	1	1	1
	MEAN		39	55	35	27	29	25	27	23
	STD									
123678-HEXACHLORO-DIBENZO-P-DIOXIN	N		1	1	1	1	1	1	1	1
	MEAN		42	71	61	35	35	37	30	30
	STD									
1234678-HEPTACHLORO-DIBENZO-P-DIOXIN	N		1	1	1	1	1	1	1	1
	MEAN		8	8	11	7	9	7	6	9
	STD									
OCTACHLORO-DIBENZO-P-DIOXIN	N		1		1	1	1	1	1	1
	MEAN		77		15	29	31	10	17	21
	STD									
2378-TETRACHLORO-DIBENZOFURAN	N					1	1	1	1	1
	MEAN					5	2	2	3	6
	STD									

[*] All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.'

LAKE HURON, CHANNEL SHELTER ISLAND

HERRING GULL		YEAR								
		80	81	82	83	84	85	86	87	88
23478-PENTACHLORO-DIBENZOFURAN	N					1	1	1	1	1
	MEAN					29	25	22	24	23
	STD									
123478-/ 123467-HEXACHLORO-DIBENZOFURAN	N					1	1	1	1	1
	MEAN					9	6	6	7	3
	STD									
123678-HEXACHLORO-DIBENZOFURAN	N					1	1	1	1	1
	MEAN					12	9	9	11	2
	STD									
HEPTACHLOR EPOXIDE	N		2	10	11	10	10	1	1	16
	MEAN		0.125	0.129	.0736	0.087	0.091	0.122	.0967	.1068
	STD		.0212	.0669	.0196	.0295	.0378			.0377
ALPHA-HEXACHLORO-CYCLOHEXANE	N				11	10	10		1	16
	MEAN				.0048	0.003	.0042		.0025	.0023
	STD				.0028	.0011	.0012			0
BETA-HEXACHLORO-CYCLOHEXANE	N		10	10	11	10	10	1	1	16
	MEAN		0.024	0.039	.0164	0.01	0.009	.0005	.0031	.0033
	STD		.0052	.0185	.0067	0	.0021			.0013
GAMMA-HEXACHLORO-CYCLOHEXANE	N								1	16
	MEAN								.0021	.0018
	STD									0
TOTAL MERCURY	N		10	10	11		10			
	MEAN		0.155	0.222	.1636		0.124			
	STD		.0477	.0434	0.062		.0158			
MIREX	N	10	10	10	11	10	10	1	1	16
	MEAN	0.198	0.061	0.229	.0664	0.029	0.083	0.13	.0518	.0904
	STD	.2828	0.03	.2241	.0638	.0277	.1217			.1182

'All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.[*]

LAKE HURON, CHANNEL SHELTER ISLAND

HERRING GULL		YEAR								
		80	81	82	83	84	85	86	87	88
PHOTOMIREX	N							1	1	16
	MEAN							0.061	.0177	.0377
	STD									.0458
CIS-NONACHLOR	N							1	1	16
	MEAN							0.044	.0308	.0436
	STD									.0164
TRANS-NONACHLOR	N			10	11	10	10	1	1	16
	MEAN			0.046	.0155	0.012	0.013	0.023	.1218	.1018
	STD			.0171	.0069	.0042	.0048			.0452
OCTACHLORO-STYRENE	N								1	16
	MEAN								.0707	.0504
	STD									0.021
PCB 1260	N	10	10	10	11	10		1	1	16
	MEAN	68.85	62.73	66.04	45.24	49.71		16.9	11.33	13.8
	STD	21.99	17.9	28.54	13.05	24.13				4.904
PCB 1254:1260 (conversion to total PCB congener conc see pg. 39)	N	10	10	10	11	10	10	1	1	16
	MEAN	69.55	65.28	71.57	48.58	54.84	48.4	46	31.26	37.87
	STD	23.07	19.06	31.44	13.54	27.03	15.3			13.25

---

[*] All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.[*]

LAKE HURON, NOTTAWASAGA ISLAND

HERRING GULL		YEAR
		80
PERCENT LIPID IN EGG	N	10
	MEAN	7.93
	STD	.8845
1234-CHLOROBENZENE	N	10
	MEAN	.0043
	STD	.0027
1235-/ 1245-CHLOROBENZENE	N	10
	MEAN	.0045
	STD	.0017
PENTA-CHLOROBENZENE	N	10
	MEAN	.0107
	STD	.0073
HEXA-CHLOROBENZENE	N	10
	MEAN	.0784
	STD	.0379
DDE	N	10
	MEAN	2.133
	STD	1.136
MIREX	N	10
	MEAN	0.307
	STD	.2966
PCB 1260	N	10
	MEAN	14.47
	STD	6.793
PCB 1254:1260 (conversion to total PCB congener conc see pg. 39)	N	10
	MEAN	16.19
	STD	7.432

[*] All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.[*]

LAKE HURON, WALLIS ROCK

DOUBLE-CRESTED CORMORANT		YEAR		
		71	72	73
PERCENT LIPID IN EGG	N	2	3	1
	MEAN	3.9	7.7	3.2
	STD	.5657	1.852	
HEXA-CHLOROBENZENE	N	2	3	1
	MEAN	0.495	.0083	0.02
	STD	.6576	.0029	
DDD	N	2	3	1
	MEAN	0.235	.1367	0.2
	STD	.1344	.1102	
DDE	N	2	3	1
	MEAN	15.85	15.6	12.4
	STD	2.051	1.908	
DDT	N	2	3	1
	MEAN	1.576	.4321	.6258
	STD	.8060	.4477	
DIELDRIN	N	2	3	1
	MEAN	0.465	.1233	0.53
	STD	.1202	.1358	
HEPTACHLOR EPOXIDE	N	2	3	1
	MEAN	0.095	0.04	0.06
	STD	.0636	0.01	
TOTAL MERCURY	N	2	3	1
	MEAN	0.82	.5267	0.71
	STD	.1131	.0404	
PCB 1260	N	2	3	1
	MEAN	41.75	24.93	17.4
	STD	11.67	2.714	

[*] All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.[*]

LAKE HURON, SOUTH LIMESTONE ISLAND

HERRING GULL		YEAR 76
PERCENT LIPID IN EGG	N	2
	MEAN	9.3
	STD	1.414
ALPHA-CHLORDANE	N	2
	MEAN	0.125
	STD	.0212
OXY-CHLORDANE	N	2
	MEAN	0.342
	STD	.0764
HEXA-CHLOROBENZENE	N	2
	MEAN	0.114
	STD	.0269
DDD	N	2
	MEAN	.0007
	STD	0
DDE	N	2
	MEAN	23.4
	STD	11.17
DDT	N	2
	MEAN	.7409
	STD	.4030
DIELDRIN	N	2
	MEAN	0.49
	STD	.0283
HEPTACHLOR EPOXIDE	N	2
	MEAN	0.135
	STD	.0071

[*] All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.[*]

LAKE HURON, SOUTH LIMESTONE ISLAND

HERRING GULL		YEAR
		76
BETA-HEXACHLORO-CYCLOHEXANE	N	2
	MEAN	0.03
	STD	0
TOTAL MERCURY	N	2
	MEAN	0.38
	STD	.0424
MIREX	N	2
	MEAN	1.51
	STD	.2546
PHOTOMIREX	N	2
	MEAN	0.545
	STD	.0636
PCB 1260	N	2
	MEAN	62.95
	STD	5.303
PCB 1254:1260 (conversion to total PCB congener conc see pg. 39)	N	2
	MEAN	74.9
	STD	6.364

---

[*] All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.'

LAKE HURON, SOUTH LIMESTONE ISLAND

CASPIAN TERN		YEAR	
		72	80
PERCENT LIPID IN EGG	N	1	10
	MEAN	9.8	7.11
	STD		.5666
1234-CHLOROBENZENE	N		10
	MEAN		.0029
	STD		.0074
1235-/ 1245-CHLOROBENZENE	N		10
	MEAN		.0014
	STD		.0027
PENTA-CHLOROBENZENE	N		10
	MEAN		.0022
	STD		.0024
HEXA-CHLOROBENZENE	N	1	10
	MEAN	0.03	.0318
	STD		.0127
DDD	N	1	
	MEAN	0.65	
	STD		
DDE	N	1	10
	MEAN	15.8	3.748
	STD		1.297
DDT	N	1	
	MEAN	.7152	
	STD		
DIELDRIN	N	1	
	MEAN	0.08	
	STD		

'All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.'

LAKE HURON, SOUTH LIMESTONE ISLAND

CASPIAN TERN		YEAR	
		72	80
HEPTACHLOR EPOXIDE	N	1	
	MEAN	0.03	
	STD		
TOTAL MERCURY	N	1	
	MEAN	0.94	
	STD		
MIREX	N		10
	MEAN		0.306
	STD		.1511
PCB 1260	N	1	10
	MEAN	31.8	22.67
	STD		8.093
PCB 1254:1260 (conversion to total PCB congener conc see pg. 39)	N		10
	MEAN		26.04
	STD		9.668

'All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.[*]

LAKE HURON, BLACKBILL ISLANDS

DOUBLE-CRESTED CORMORANT		YEAR	
		70	71
PERCENT LIPID IN EGG	N	7	8
	MEAN	4.543	5.5
	STD	3.561	1.307
HEXA-CHLOROBENZENE	N		6
	MEAN		.2067
	STD		0.283
DDD	N	7	8
	MEAN	4.508	.1694
	STD	4.368	.2136
DDE	N	7	8
	MEAN	24.89	15.64
	STD	29.49	8.936
DDT	N	7	8
	MEAN	10.52	.4184
	STD	9.826	.4116
DIELDRIN	N	7	8
	MEAN	.7036	.4646
	STD	0.645	0.278
HEPTACHLOR EPOXIDE	N	7	8
	MEAN	.7327	.0553
	STD	.7209	.0388
TOTAL MERCURY	N		7
	MEAN		.5443
	STD		.2316
PCB 1260	N	7	8
	MEAN	20.54	22.78
	STD	16.47	10.47

[*] All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.[*]

LAKE HURON, CASTLE ROCK

HERRING GULL		YEAR 80
PERCENT LIPID IN EGG	N	10
	MEAN	7.74
	STD	0.964
1234-CHLOROBENZENE	N	10
	MEAN	0.001
	STD	.0014
1235-/ 1245-CHLOROBENZENE	N	10
	MEAN	.0005
	STD	0
PENTA-CHLOROBENZENE	N	10
	MEAN	.0063
	STD	.0056
HEXA-CHLOROBENZENE	N	10
	MEAN	.0928
	STD	0.047
DDE	N	10
	MEAN	3.349
	STD	1.109
MIREX	N	10
	MEAN	0.171
	STD	.1333
PCB 1260	N	10
	MEAN	16.4
	STD	5.904
PCB 1254:1260 (conversion to total PCB congener conc see pg. 39)	N	10
	MEAN	17.59
	STD	6.448

[*] All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.[*]

LAKE HURON, BUSTARD ROCK

DOUBLE-CRESTED CORMORANT		YEAR
		72
PERCENT LIPID IN EGG	N	3
	MEAN	8.667
	STD	2.663
HEXA-CHLOROBENZENE	N	3
	MEAN	0.01
	STD	0
DDD	N	3
	MEAN	0.11
	STD	.1058
DDE	N	3
	MEAN	16.37
	STD	8.41
DDT	N	3
	MEAN	.3427
	STD	.2411
DIELDRIN	N	3
	MEAN	0.29
	STD	.1609
HEPTACHLOR EPOXIDE	N	3
	MEAN	0.04
	STD	0.02
TOTAL MERCURY	N	3
	MEAN	.8267
	STD	.0862
PCB 1260	N	3
	MEAN	22.97
	STD	12.63

---

[*] All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.[1]

LAKE HURON, HALF MOON ISLAND

CASPIAN TERN		YEAR
		80
PERCENT LIPID IN EGG	N	9
	MEAN	8.844
	STD	.8263
1234-CHLOROBENZENE	N	9
	MEAN	.0023
	STD	.0033
1235-/ 1245-CHLOROBENZENE	N	9
	MEAN	0.001
	STD	.0015
PENTA-CHLOROBENZENE	N	9
	MEAN	.0023
	STD	.0024
HEXA-CHLOROBENZENE	N	9
	MEAN	.0409
	STD	.0157
DDE	N	9
	MEAN	3.246
	STD	1.115
MIREX	N	9
	MEAN	0.09
	STD	.0634
PCB 1260	N	9
	MEAN	17.37
	STD	6.282
PCB 1254:1260 (conversion to total PCB congener conc see pg. 39)	N	9
	MEAN	18.49
	STD	6.878

[1] All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.[*]

LAKE HURON, GULL ROCK

DOUBLE-CRESTED CORMORANT		YEAR	
		72	75
PERCENT LIPID IN EGG	N	9	1
	MEAN	7.5	4.1
	STD	1.401	
HEXA-CHLOROBENZENE	N	9	1
	MEAN	.0111	0.01
	STD	.0055	
DDD	N	9	1
	MEAN	.1222	0.005
	STD	.0636	
DDE	N	9	1
	MEAN	14.49	3.76
	STD	5.292	
DDT	N	9	1
	MEAN	.2522	.0447
	STD	.2332	
DIELDRIN	N	9	1
	MEAN	.4133	0.23
	STD	.3633	
HEPTACHLOR EPOXIDE	N	9	1
	MEAN	.0589	0.03
	STD	.0494	
TOTAL MERCURY	N	9	1
	MEAN	.3556	0.36
	STD	0.121	
PCB 1260	N	9	1
	MEAN	24.8	17.3
	STD	8.891	

[*] All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.[*]

LAKE HURON, GULL ROCK

DOUBLE-CRESTED CORMORANT		YEAR	
		72	75
PCB 1254:1260 (conversion to total PCB congener conc see pg. 39)	N		1
	MEAN		22.3
	STD		

---

[*] All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.[*]

LAKE HURON, THE COUSINS ISLAND

CASPIAN TERN		YEAR
		80
PERCENT LIPID IN EGG	N	10
	MEAN	7.01
	STD	0.731
1234-CHLOROBENZENE	N	10
	MEAN	.0016
	STD	.0033
1235-/ 1245-CHLOROBENZENE	N	10
	MEAN	.0005
	STD	0
PENTA-CHLOROBENZENE	N	10
	MEAN	.0038
	STD	.0053
HEXA-CHLOROBENZENE	N	10
	MEAN	.0459
	STD	.0323
DDE	N	10
	MEAN	4.692
	STD	1.899
MIREX	N	10
	MEAN	0.069
	STD	.0213
PCB 1260	N	10
	MEAN	28.63
	STD	8.454
PCB 1254:1260 (conversion to total PCB congener conc see pg. 39)	N	10
	MEAN	30.89
	STD	9.277

[*] All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.[*]

LAKE HURON, DOUCET ROCK

DOUBLE-CRESTED CORMORANT		YEAR		
		71	72	75
PERCENT LIPID IN EGG	N	7	2	1
	MEAN	5.371	7.35	0.7
	STD	.7365	.3536	
HEXA-CHLOROBENZENE	N	7	2	1
	MEAN	.0371	.0075	0.01
	STD	.0138	.0035	
DDD	N	7	2	1
	MEAN	.1261	0.12	0.13
	STD	.2553	0.099	
DDE	N	7	2	1
	MEAN	17.77	15.21	3.32
	STD	12.27	13.71	
DDT	N	7	2	1
	MEAN	.2971	.3017	.0894
	STD	.2845	.2371	
DIELDRIN	N	7	2	1
	MEAN	.5571	0.5	0.16
	STD	0.356	.5798	
HEPTACHLOR EPOXIDE	N	7	2	1
	MEAN	.0586	.0325	0.01
	STD	.0344	.0389	
TOTAL MERCURY	N	7	2	1
	MEAN	.6286	0.385	0.51
	STD	.2637	.0495	
PCB 1260	N	7	2	1
	MEAN	31.91	25.6	10.1
	STD	13.09	19.8	

[*] All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.[*]

LAKE HURON, DOUCET ROCK

DOUBLE-CRESTED CORMORANT		YEAR		
		71	72	75
PCB 1254:1260 (conversion to total PCB congener conc see pg. 39)	N			1
	MEAN			11.9
	STD			

[*] All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.[*]

LAKE HURON, DOUBLE ISLAND

HERRING GULL		YEAR													
		74	75	77	78	79	80	81	82	83	84	85	86	87	88
PERCENT LIPID IN EGG	N	10	10	10	10	10	10	10	10	11	10	10	1	1	13
	MEAN	9.31	7.25	9.42	8.98	8.72	9.06	9.58	8.3	8.455	9.85	9.51	8.3	8.6	8.392
	STD	0.948	1.136	2.853	.6408	1.004	1.485	.8715	.9854	1.214	.9618	.5801			.5766
ARSENIC	N			1											
	MEAN			0.015											
	STD														
CADMIUM	N			1											
	MEAN			0.005											
	STD														
ALPHA-CHLORDANE	N			10		10	10	10	10	11	10	10	1	1	13
	MEAN			0.042		0.095	0.063	0.174	0.012	.0109	0.01	0.016	0.01	.0036	.0154
	STD			.0181		.0317	.0283	.0712	.0042	.0049	0	.0107			.0059
GAMMA-CHLORDANE	N							5	10	11	10	10		1	13
	MEAN							0.074	.0095	.0025	.0055	.0052		.0017	.0013
	STD							.0365	.0016	0	.0016	.0018			
OXY-CHLORDANE	N			10	10	10	10	10	10	11	10	10	1	1	13
	MEAN			.3580	0.166	0.113	0.084	0.129	0.244	.2218	0.136	0.222	0.129	.1051	.1347
	STD			.3309	.0911	.0807	.0608	.0412	.1137	.1735	.0443	.1163			.1077
123-CHLOROBENZENE	N					10									
	MEAN					0.001									
	STD					0									
124-CHLOROBENZENE	N					10									
	MEAN					.0032									
	STD					.0022									
135-CHLOROBENZENE	N					10									
	MEAN					0.001									
	STD					0									

[*] All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.*

LAKE HURON, DOUBLE ISLAND

HERRING GULL		YEAR													
		74	75	77	78	79	80	81	82	83	84	85	86	87	88
1234-CHLOROBENZENE	N					10	10	10	10	11	10	10		1	13
	MEAN					.0057	.0023	0.003	.0012	.0176	.0172	.0013		.0176	0.011
	STD					0.006	.0038	.0058	.0007	.0352	.0451	.0015			.0085
1235-/ 1245-CHLOROBENZENE	N					10	10	10	10	11	10	10		1	13
	MEAN					.0073	0.002	.0026	0.002	.0055	.0027	.0015		.0266	.0118
	STD					.0038	.0032	.0045	.0017	.0081	.0068	0.002			
PENTA-CHLOROBENZENE	N					10	10	10	10	11	10	10		1	13
	MEAN					.0132	.0056	.0122	.0061	.0098	.0117	.0081		.0097	.0063
	STD					.0068	.0013	.0194	.0026	.0091	.0126	.0125			0.003
HEXA-CHLOROBENZENE	N	10	10	10	10	10	10	10	10	11	10	10	1	1	13
	MEAN	.2983	.2394	.2110	0.088	0.104	.0554	.0693	.0692	.0501	.0633	.0666	0.044	.0194	.0425
	STD	.0801	0.075	.0536	.0473	.0427	.0154	0.025	.0092	.0158	.0191	0.019			.0095
DDD	N	10	10	10		10	10	10	7	11	10	10	1	1	13
	MEAN	0.364	.0168	.2590		0.114	0.085	0.045	.0743	.0114	0.008	0.023	.0005	.0037	.0071
	STD	.0881	.0207	.1197		.0445	.0321	.0127	.0244	.0074	.0048	.0095			.0111
DDE	N	10	10	10	10	10	10	10	10	11	10	10	1	1	13
	MEAN	13.82	16.21	19.03	7.041	2.059	2.597	3.559	3.84	3.246	2.578	3.081	2.1	1.599	1.688
	STD	6.652	8.584	15.1	2.584	.7564	1.282	1.4	2.06	2.018	.7193	1.372			.7558
DDT	N	10	10	10	10	10	10	10	10	11	10	10	1	1	13
	MEAN	.5547	.1710	.0900	0.089	0.06	0.048	0.04	0.085	.0214	.0155	0.074	0.06	0.028	.0728
	STD	.2793	.0952	.0658	.0208	.0422	.0215	.0176	.0433	.0145	0.009	.0259			.0467
DIELDRIN	N	10	10	10	10	10	10	10	10	11	10	10	1	1	13
	MEAN	0.534	0.413	0.506	0.224	0.316	0.239	0.23	0.262	.2455	0.251	0.323	0.174	.3309	.2437
	STD	0.156	.1831	.2351	.1242	.1764	.1775	.0945	.1168	.1449	.0697	0.192			.1076
2378-TETRACHLORO-DIBENZO-P-DIOXIN	N										1	1	1	1	1
	MEAN										28	37	31	27	19
	STD														

---

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.'

LAKE HURON, DOUBLE ISLAND

HERRING GULL		YEAR													
		74	75	77	78	79	80	81	82	83	84	85	86	87	88
12378-PENTACHLORO-DIBENZO-P-DIOXIN	N										1	1	1	1	1
	MEAN										12	19	17	8	7
	STD														
123678-HEXACHLORO-DIBENZO-P-DIOXIN	N										1	1	1	1	1
	MEAN										11	18	21	6	7
	STD														
1234678-HEPTACHLORO-DIBENZO-P-DIOXIN	N										1	1	1	1	1
	MEAN										5	8	6	6	3
	STD														
OCTACHLORO-DIBENZO-P-DIOXIN	N										1	1	1	1	1
	MEAN										8	10	10	ND	5
	STD														
2378-TETRACHLORO-DIBENZOFURAN	N										1	1	1	1	1
	MEAN										4	ND	2	2	1
	STD														
23478-PENTACHLORO-DIBENZOFURAN	N										1	1	1	1	1
	MEAN										14	12	12	6	6
	STD														
123478-/123467-HEXACHLORO-DIBENZOFURAN	N										1	1	1	1	1
	MEAN										4	4	4	4	ND
	STD														
123678-HEXACHLORO-DIBENZOFURAN	N										1	1	1	1	1
	MEAN										4	6	4	4	ND
	STD														
HEPTACHLOR EPOXIDE	N	10	10	10	10	10	10	9	10	11	10	10	1	1	13
	MEAN	0.159	0.092	0.187	0.099	0.097	0.107	.0911	0.115	.0927	0.09	0.149	0.11	.0829	.1016
	STD	.0331	.0464	.1304	.0381	.0427	.0359	.0271	0.035	.0629	.0176	.0746			.0384

'All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.*

LAKE HURON, DOUBLE ISLAND

HERRING GULL		YEAR													
		74	75	77	78	79	80	81	82	83	84	85	86	87	88
ALPHA-HEXACHLORO-CYCLOHEXANE	N								10	11	10	10		1	13
	MEAN								.0033	.0055	.0025	.0045		.0025	.0026
	STD								.0012	.0031	0	.0011			
BETA-HEXACHLORO-CYCLOHEXANE	N			10	10	10	7	10	10	11	10	10	1	1	13
	MEAN			0.051	.0205	0.019	.0059	0.015	.0068	.0134	0.012	0.007	.0005	.0031	.0036
	STD			.0228	.0194	.0173	.0043	.0097	.0058	.0067	.0063	.0026			.0013
GAMMA-HEXACHLORO-CYCLOHEXANE	N													1	13
	MEAN													.0022	.0024
	STD														
LEAD	N			1											
	MEAN			0.12											
	STD														
TOTAL MERCURY	N	10	10					10	10	11		10			
	MEAN	0.186	0.311					0.324	0.391	.2082		0.214			
	STD	.0527	.1179					.0682	.0588	.0733		.0398			
MIREX	N	10	10	10	10	10	10	10	10	11	10	10	1	1	13
	MEAN	0.519	0.547	0.553	.1635	0.17	0.058	0.17	0.381	.1527	0.197	0.292	0.114	.0554	.0741
	STD	.2219	.6761	.5703	.2226	.1648	.0496	.1546	.3777	0.171	.1882	.3828			.0763
PHOTOMIREX	N			10	10	10							1	1	13
	MEAN			0.214	.0566	0.066							0.051	.0177	.0339
	STD			.1994	.0743	0.051									.0328
CIS-NONACHLOR	N												1	1	13
	MEAN												0.062	.0337	.0472
	STD														.0142
TRANS-NONACHLOR	N								10	11	10	10	1	1	13
	MEAN								0.066	0.025	0.019	0.014	0.079	.0351	.0646
	STD								.0299	.0163	.0088	.0105			.0171

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.[*]

LAKE HURON, DOUBLE ISLAND

HERRING GULL		YEAR													
		74	75	77	78	79	80	81	82	83	84	85	86	87	88
OCTACHLORO-STYRENE	N													1	13
	MEAN													.0103	.0143
	STD														.0041
PCB 1260	N	10	10	10	10	10	10	10	10	11	10		1	1	13
	MEAN	42.1	35.37	65.94	28.3	22.65	15.59	20.72	24.98	16.46	15.07		4.42	3.911	3.683
	STD	12.53	11.27	41.81	8.467	6.646	6.755	6.938	12.51	5.829	5.138				.9242
PCB 1254:1260 (conversion to total PCB congener conc see pg. 39)	N	10	10	10	10	10	10	10	10	11	10	10	1	1	13
	MEAN	56.34	46.01	76.9	32.62	26.24	17.41	23.08	30.51	19.69	18.36	19.56	11.7	8.951	9.272
	STD	16.76	14.65	48.32	9.518	7.358	7.747	7.633	15.22	6.56	6.37	5.771			2.326
SELENIUM	N			1											
	MEAN			0.2											
	STD														

[*] All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.[*]

LAKE HURON, TALON ROCK

DOUBLE-CRESTED CORMORANT		YEAR	
		71	72
PERCENT LIPID IN EGG	N	3	1
	MEAN	3.8	6.1
	STD	1.732	
HEXA-CHLOROBENZENE	N	3	1
	MEAN	.0167	0.01
	STD	.0115	
DDD	N	3	1
	MEAN	.1303	0.07
	STD	.2249	
DDE	N	3	1
	MEAN	17.7	5.12
	STD	5.484	
DDT	N	3	1
	MEAN	.3799	.0022
	STD	.1612	
DIELDRIN	N	3	1
	MEAN	.3933	0.01
	STD	.1069	
HEPTACHLOR EPOXIDE	N	3	1
	MEAN	.0302	0.03
	STD	.0262	
TOTAL MERCURY	N	3	1
	MEAN	.5967	0.32
	STD	.0907	
PCB 1260	N	3	1
	MEAN	24.8	10.3
	STD	6.986	

[*] All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.[*]

LAKE HURON, AFRICA ROCK

DOUBLE-CRESTED CORMORANT		YEAR		
		73	75	79
PERCENT LIPID IN EGG	N	1	2	9
	MEAN	3.6	3.8	4.5
	STD		.1414	0.495
ALPHA-CHLORDANE	N			9
	MEAN			.0256
	STD			.0151
OXY-CHLORDANE	N			9
	MEAN			.0533
	STD			.0187
HEXA-CHLOROBENZENE	N	1	2	9
	MEAN	0.02	0.01	.0433
	STD			.0132
DDD	N	1	2	9
	MEAN	0.26	0.15	.1511
	STD		.0566	.1082
DDE	N	1	2	9
	MEAN	15.4	7.145	2.447
	STD		.5303	2.773
DDT	N	1	2	9
	MEAN	.6928	.1006	.0394
	STD		.0158	.0326
DIELDRIN	N	1	2	9
	MEAN	0.49	0.525	.2767
	STD		.2616	.1618
HEPTACHLOR EPOXIDE	N	1	2	9
	MEAN	0.1	0.05	.0567
	STD		.0283	.0377

[*] All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.[*]

LAKE HURON, AFRICA ROCK

DOUBLE-CRESTED CORMORANT		YEAR		
		73	75	79
BETA-HEXACHLORO-CYCLOHEXANE	N			9
	MEAN			.0156
	STD			.0085
TOTAL MERCURY	N	1	2	
	MEAN	0.41	0.31	
	STD		.1414	
MIREX	N			8
	MEAN			.1501
	STD			.1249
PHOTOMIREX	N			8
	MEAN			.0527
	STD			.0646
PCB 1260	N	1	2	9
	MEAN	28.3	9.92	17.75
	STD		5.629	7.506
PCB 1254:1260 (conversion to total PCB congener conc see pg. 39)	N		2	9
	MEAN		11.21	20.5
	STD		6.343	8.877

---

[*] All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.[*]

LAKE HURON, PUMPKIN POINT

HERRING GULL		YEAR		
		80	85	86
PERCENT LIPID IN EGG	N	10	10	1
	MEAN	7.91	9.45	8
	STD	.7937	.7878	
ALPHA-CHLORDANE	N		10	1
	MEAN		0.012	.0005
	STD		.0075	
GAMMA-CHLORDANE	N		10	
	MEAN		.0055	
	STD		.0016	
OXY-CHLORDANE	N		10	1
	MEAN		0.188	0.201
	STD		0.114	
1234-CHLOROBENZENE	N	10	10	
	MEAN	.0063	.0251	
	STD	.0068	.0529	
1235-/ 1245-CHLOROBENZENE	N	10	10	
	MEAN	0.005	.0027	
	STD	.0041	.0052	
PENTA-CHLOROBENZENE	N	10	10	
	MEAN	.0118	.0093	
	STD	.0087	.0131	
HEXA-CHLOROBENZENE	N	10	10	1
	MEAN	.0899	.0609	0.042
	STD	.0476	.0308	
DDD	N		10	1
	MEAN		0.015	.0005
	STD		.0071	

[*] All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.*

LAKE HURON, PUMPKIN POINT

HERRING GULL		YEAR		
		80	85	86
DDE	N	10	10	1
	MEAN	3.135	4.029	3.2
	STD	1.317	2.692	
DDT	N		10	1
	MEAN		0.042	0.056
	STD		.0244	
DIELDRIN	N		10	1
	MEAN		0.281	0.196
	STD		.1316	
2378-TETRACHLORO-DIBENZO-P-DIOXIN	N		1	1
	MEAN		4	15
	STD			
12378-PENTACHLORO-DIBENZO-P-DIOXIN	N		1	1
	MEAN		3	3
	STD			
123678-HEXACHLORO-DIBENZO-P-DIOXIN	N		1	1
	MEAN		6	5
	STD			
1234678-HEPTACHLORO-DIBENZO-P-DIOXIN	N		1	1
	MEAN		6	6
	STD			
OCTACHLORO-DIBENZO-P-DIOXIN	N		1	1
	MEAN		10	10
	STD			
2378-TETRACHLORO-DIBENZOFURAN	N		1	1
	MEAN		ND	ND
	STD			

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.[*]

LAKE HURON, PUMPKIN POINT

HERRING GULL		YEAR		
		80	85	86
23478-PENTACHLORO-DIBENZOFURAN	N		1	1
	MEAN		3	3
	STD			
123478-/123467-HEXACHLORO-DIBENZOFURAN	N		1	1
	MEAN		ND	ND
	STD			
123678-HEXACHLORO-DIBENZOFURAN	N		1	1
	MEAN		ND	ND
	STD			
HEPTACHLOR EPOXIDE	N		10	1
	MEAN		0.136	0.167
	STD		.0785	
ALPHA-HEXACHLORO-CYCLOHEXANE	N		10	
	MEAN		0.003	
	STD		.0011	
BETA-HEXACHLORO-CYCLOHEXANE	N		10	1
	MEAN		.0056	.0005
	STD		.0026	
TOTAL MERCURY	N		10	
	MEAN		0.184	
	STD		.0433	
MIREX	N	10	10	1
	MEAN	0.127	0.118	0.155
	STD	.1782	.1032	
PHOTOMIREX	N			1
	MEAN			0.066
	STD			

---

[*] All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.[*]

LAKE HURON, PUMPKIN POINT

HERRING GULL		YEAR		
		80	85	86
CIS-NONACHLOR	N			1
	MEAN			0.059
	STD			
TRANS-NONACHLOR	N		10	1
	MEAN		.0145	0.088
	STD		.0112	
PCB 1260	N	10		1
	MEAN	24.1		5.35
	STD	12.82		
PCB 1254:1260 (conversion to total PCB congener conc see pg. 39)	N	10	10	1
	MEAN	26.39	21.71	14.3
	STD	13.93	10.42	

[*] All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.*

LAKE MICHIGAN, ISLE AUX GALETS

CASPIAN TERN		YEAR 80
PERCENT LIPID IN EGG	N	9
	MEAN	8.8
	STD	.8047
1234-CHLOROBENZENE	N	9
	MEAN	.0005
	STD	
1235-/ 1245-CHLOROBENZENE	N	9
	MEAN	.0005
	STD	
PENTA-CHLOROBENZENE	N	9
	MEAN	.0021
	STD	.0029
HEXA-CHLOROBENZENE	N	9
	MEAN	.0376
	STD	.0252
DDE	N	9
	MEAN	4.614
	STD	1.173
MIREX	N	9
	MEAN	.0444
	STD	.0133
PCB 1260	N	9
	MEAN	24.67
	STD	6.236
PCB 1254:1260 (conversion to total PCB congener conc see pg. 39)	N	9
	MEAN	25.9
	STD	6.539

---

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.'

LAKE MICHIGAN, HAT ISLAND

HERRING GULL		YEAR 77
PERCENT LIPID IN EGG	N	9
	MEAN	10.04
	STD	.9071
ARSENIC	N	1
	MEAN	0.015
	STD	
CADMIUM	N	1
	MEAN	0.005
	STD	
ALPHA-CHLORDANE	N	9
	MEAN	.2011
	STD	.1152
OXY-CHLORDANE	N	9
	MEAN	1.234
	STD	.9891
HEXA-CHLOROBENZENE	N	9
	MEAN	0.228
	STD	.1629
DDD	N	9
	MEAN	.2893
	STD	.0313
DDE	N	9
	MEAN	27.76
	STD	8.993
DDT	N	9
	MEAN	.2663
	STD	.0915

'All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.[*]

LAKE MICHIGAN, HAT ISLAND

HERRING GULL		YEAR
		77
DIELDRIN	N	9
	MEAN	.7211
	STD	.5993
HEPTACHLOR EPOXIDE	N	9
	MEAN	.2622
	STD	.0909
BETA-HEXACHLOROCYCLOHEXANE	N	9
	MEAN	.0322
	STD	.0282
LEAD	N	1
	MEAN	0.15
	STD	
MIREX	N	9
	MEAN	.2122
	STD	.2893
PHOTOMIREX	N	9
	MEAN	.0933
	STD	.1086
PCB 1260	N	9
	MEAN	96.48
	STD	31.24
PCB 1254:1260 (conversion to total PCB congener conc see pg. 39)	N	9
	MEAN	111.6
	STD	35.72
SELENIUM	N	1
	MEAN	0.5
	STD	

---

[*] All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.*

LAKE MICHIGAN, HAT ISLAND

CASPIAN TERN		YEAR
		80
PERCENT LIPID IN EGG	N	9
	MEAN	8.511
	STD	.5776
1234-CHLOROBENZENE	N	9
	MEAN	.0005
	STD	0
1235-/ 1245-CHLOROBENZENE	N	9
	MEAN	.0005
	STD	0
PENTA-CHLOROBENZENE	N	9
	MEAN	.0039
	STD	.0088
HEXA-CHLOROBENZENE	N	9
	MEAN	.0379
	STD	.0306
DDE	N	9
	MEAN	5.624
	STD	2.218
MIREX	N	9
	MEAN	.0522
	STD	.0299
PCB 1260	N	9
	MEAN	26.51
	STD	8.818
PCB 1254:1260 (conversion to total PCB congener conc see pg. 39)	N	9
	MEAN	27.77
	STD	8.915

[*] All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.[*]

LAKE MICHIGAN, GULL ISLAND

HERRING GULL		YEAR									
		78	79	80	81	82	83	84	85	87	88
PERCENT LIPID IN EGG	N	10	10	10		10	11	10	9	1	1
	MEAN	9.73	9.04	8.47		9.21	7.9	9.47	9.633	9.2	9.3
	STD	0.99	.4115	.9334		2.156	0.645	.8832	.8062		
ALPHA-CHLORDANE	N	4	10	10		10	11	10	9	1	1
	MEAN	0.19	0.177	0.184		0.041	.0309	0.021	.0222	.0167	.0259
	STD	.0783	.1088	.0919		.0088	.0122	.0074	.0097		
GAMMA-CHLORDANE	N					10	11	10	9	1	1
	MEAN					0.019	.0039	0.048	.0067	.0016	.0012
	STD					.0074	.0013	.0289	.0025		
OXY-CHLORDANE	N	10	10	10		10	11	10	9	1	1
	MEAN	0.599	0.568	0.595		0.726	0.56	0.274	.2244	.2917	.3376
	STD	0.36	0.209	.2725		.3059	0.196	.0911	.0557		
1234-CHLOROBENZENE	N			10		10	11	10	9	1	1
	MEAN			.0141		.0046	.0112	.0005	.0219	.0176	.0169
	STD			.0398		.0039	.0231	0	.0649		
1235-/ 1245-CHLOROBENZENE	N			10		10	11	10	9	1	1
	MEAN			.0059		.0057	.0026	.0005	.0019	.0266	.0248
	STD			.0136		.0039	.0045	0	.0049		
PENTA-CHLOROBENZENE	N			10		10	11	10	9	1	1
	MEAN			.0105		.0183	.0085	.0029	.0041	.0097	.0093
	STD			.0091		.0118	.0055	.0012	.0075		
HEXA-CHLOROBENZENE	N	10	10	10		10	11	10	9	1	1
	MEAN	0.123	0.135	.0997		.1196	.0701	.0611	0.047	.0355	.0562
	STD	.0521	.0544	.0279		.0193	.0388	0.016	.0071		
DDD	N		10	10		6	11	10	9	1	1
	MEAN		0.242	0.219		.1017	.0291	.0135	0.02	.0098	.0096
	STD		.1095	.0862		.0371	.0247	0.01	.0087		

---

[*] All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.[1]

LAKE MICHIGAN, GULL ISLAND

HERRING GULL		YEAR									
		78	79	80	81	82	83	84	85	87	88
DDE	N	10	10	10		10	11	10	9	1	1
	MEAN	22.91	14.72	12.95		13.84	6.185	6.371	5.921	3.95	6.108
	STD	8.306	4.764	6.484		3.829	1.372	2.335	1.589		
DDT	N	10	10	10		10	11	10	9	1	1
	MEAN	0.119	0.107	0.196		0.167	.0436	0.025	.0356	0.074	.1043
	STD	.0599	.0476	0.086		.0629	.0304	.0178	0.024		
DIELDRIN	N	10	10	10		10	11	10	9	1	1
	MEAN	0.83	0.716	0.748		0.876	.6827	0.411	.3989	.3271	.5464
	STD	.3653	.3151	0.34		.2814	.3296	.1269	.1405		
2378-TETRACHLORO-DIBENZO-P-DIOXIN	N				1	1	1	1	1	1	1
	MEAN				58	23	10	12	12	17	14
	STD										
12378-PENTACHLORO-DIBENZO-P-DIOXIN	N				1	1	1	1	1	1	1
	MEAN				31	26	8	13	11	7	14
	STD										
123678-HEXACHLORO-DIBENZO-P-DIOXIN	N				1	1	1	1	1	1	1
	MEAN				32	24	9	12	10	11	17
	STD										
1234678-HEPTACHLORO-DIBENZO-P-DIOXIN	N				1	1	1	1	1	1	1
	MEAN				ND	ND	ND	5	ND	6	4
	STD										
OCTACHLORO-DIBENZO-P-DIOXIN	N				1	1	1	1	1	1	1
	MEAN				21	10	10	8	10	ND	4
	STD										
2378-TETRACHLORO-DIBENZOFURAN	N							1	1	1	1
	MEAN							4	2	2	1
	STD										

[1] All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.[*]

LAKE MICHIGAN, GULL ISLAND

HERRING GULL		YEAR									
		78	79	80	81	82	83	84	85	87	88
23478-PENTACHLORO-DIBENZOFURAN	N							1	1	1	1
	MEAN							17	9	7	11
	STD										
123478-/ 123467-HEXACHLORO-DIBENZOFURAN	N							1	1	1	1
	MEAN							ND	4	4	ND
	STD										
123678-HEXACHLORO-DIBENZOFURAN	N							1	1	1	1
	MEAN							4	4	4	ND
	STD										
HEPTACHLOR EPOXIDE	N	10	8	10		10	11	10	9	1	1
	MEAN	0.296	.3338	0.332		0.411	.2627	0.176	.1867	.2341	.3155
	STD	.1025	.1433	.1309		.1504	.0762	.0709	.0522		
ALPHA-HEXACHLORO-CYCLOHEXANE	N						11	10	9	1	1
	MEAN						.0073	.0025	0.005	.0025	.0023
	STD						.0026	0	0		
BETA-HEXACHLORO-CYCLOHEXANE	N	10	10	10		10	11	10	9	1	1
	MEAN	0.018	0.014	0.011		.0062	0.01	.0032	.0061	.0031	.0028
	STD	.0103	0.007	.0032		.0049	0	.0024	.0022		
GAMMA-HEXACHLORO-CYCLOHEXANE	N									1	1
	MEAN									.0021	.0018
	STD										
TOTAL MERCURY	N					10	11		9		
	MEAN					0.478	.1655		.1422		
	STD					0.121	.0327		.0205		

---

[*] All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.*

LAKE MICHIGAN, GULL ISLAND

HERRING GULL		YEAR									
		78	79	80	81	82	83	84	85	87	88
MIREX	N	10	10	10		10	11	10	9	1	1
	MEAN	0.157	0.146	0.141		0.106	.0618	0.055	.0417	.0622	0.035
	STD	.1017	0.149	.1345		.0783	.0412	.0585	.0294		
PHOTOMIREX	N	9	10							1	1
	MEAN	.0633	0.073							.0177	.0104
	STD	.0332	.0542								
CIS-NONACHLOR	N									1	1
	MEAN									.0618	.0824
	STD										
TRANS-NONACHLOR	N					10	11	10	9	1	1
	MEAN					0.117	.0273	0.018	.0122	.0947	.1503
	STD					.0371	.0162	.0103	.0067		
OCTACHLORO-STYRENE	N									1	1
	MEAN									.0103	.0075
	STD										
PCB 1260	N	10	10	10		10	11	10		1	1
	MEAN	74.91	84.03	51.49		60.54	28.35	24.72		5.891	7.462
	STD	31.83	32.93	20.33		28.95	17.08	6.301			
PCB 1254:1260 (conversion to total PCB congener conc see pg. 39)	N	10	10	10		10	11	10	9	1	1
	MEAN	91.49	92.93	58.7		63.93	32.65	28.93	26.51	16.58	21.66
	STD	36.86	35.87	23.07		29.78	19.2	7.435	7.36		

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.*

LAKE MICHIGAN, BELLOWS ISLAND

HERRING GULL		YEAR
		78
PERCENT LIPID IN EGG	N	10
	MEAN	9.8
	STD	1.111
ALPHA-CHLORDANE	N	6
	MEAN	.2417
	STD	0.088
OXY-CHLORDANE	N	10
	MEAN	0.614
	STD	.5417
HEXA-CHLOROBENZENE	N	10
	MEAN	0.134
	STD	0.085
DDE	N	10
	MEAN	23.17
	STD	9.864
DDT	N	10
	MEAN	0.202
	STD	.0531
DIELDRIN	N	10
	MEAN	0.892
	STD	.3799
HEPTACHLOR EPOXIDE	N	10
	MEAN	0.355
	STD	.1514
BETA-HEXACHLORO-CYCLOHEXANE	N	10
	MEAN	.0265
	STD	.0249

---

* All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.[*]

LAKE MICHIGAN, BELLOWS ISLAND

HERRING GULL		YEAR
		78
MIREX	N	10
	MEAN	0.33
	STD	.5966
PHOTOMIREX	N	10
	MEAN	0.141
	STD	.2309
PCB 1260	N	10
	MEAN	83.3
	STD	36.38
PCB 1254:1260 (conversion to total PCB congener conc see pg. 39)	N	10
	MEAN	101.1
	STD	46.06

---

[*] All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.*

LAKE MICHIGAN, TROUT ISLAND

HERRING GULL		YEAR
		86
PERCENT LIPID IN EGG	N	1
	MEAN	7.9
	STD	
ALPHA-CHLORDANE	N	1
	MEAN	0.039
	STD	
OXY-CHLORDANE	N	1
	MEAN	0.361
	STD	
HEXA-CHLOROBENZENE	N	1
	MEAN	0.084
	STD	
DDD	N	1
	MEAN	0.018
	STD	
DDE	N	1
	MEAN	7.91
	STD	
DDT	N	1
	MEAN	0.152
	STD	
DIELDRIN	N	1
	MEAN	0.488
	STD	

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.[*]

LAKE MICHIGAN, TROUT ISLAND

HERRING GULL		YEAR 86
2378-TETRACHLORO-DIBENZO-P-DIOXIN	N	1
	MEAN	20
	STD	
12378-PENTACHLORO-DIBENZO-P-DIOXIN	N	1
	MEAN	23
	STD	
123678-HEXACHLORO-DIBENZO-P-DIOXIN	N	1
	MEAN	20
	STD	
1234678-HEPTACHLORO-DIBENZO-P-DIOXIN	N	1
	MEAN	6
	STD	
OCTACHLORO-DIBENZO-P-DIOXIN	N	1
	MEAN	10
	STD	
2378-TETRACHLORO-DIBENZOFURAN	N	1
	MEAN	2
	STD	
23478-PENTACHLORO-DIBENZOFURAN	N	1
	MEAN	17
	STD	
123478-/123467-HEXACHLORO-DIBENZOFURAN	N	1
	MEAN	4
	STD	
123678-HEXACHLORO-DIBENZOFURAN	N	1
	MEAN	4
	STD	

---

[*] All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.[*]

LAKE MICHIGAN, TROUT ISLAND

HERRING GULL		YEAR
		86
HEPTACHLOR EPOXIDE	N	1
	MEAN	0.338
	STD	
BETA-HEXACHLORO-CYCLOHEXANE	N	1
	MEAN	.0005
	STD	
MIREX	N	1
	MEAN	0.091
	STD	
PHOTOMIREX	N	1
	MEAN	.0005
	STD	
CIS-NONACHLOR	N	1
	MEAN	0.102
	STD	
TRANS-NONACHLOR	N	1
	MEAN	0.122
	STD	
PCB 1260	N	1
	MEAN	9.72
	STD	
PCB 1254:1260 (conversion to total PCB congener conc see pg. 39)	N	1
	MEAN	27.5
	STD	

---

[*] All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.'

LAKE MICHIGAN, FISH ISLAND

HERRING GULL		YEAR 84
PERCENT LIPID IN EGG	N	1
	MEAN	9.8
	STD	
ALPHA-CHLORDANE	N	1
	MEAN	0.02
	STD	
GAMMA-CHLORDANE	N	1
	MEAN	0.005
	STD	
OXY-CHLORDANE	N	1
	MEAN	0.31
	STD	
1234-CHLOROBENZENE	N	1
	MEAN	0.005
	STD	
1235-/ 1245-CHLOROBENZENE	N	1
	MEAN	0.006
	STD	
PENTA-CHLOROBENZENE	N	1
	MEAN	0.006
	STD	
HEXA-CHLOROBENZENE	N	1
	MEAN	0.059
	STD	
DDD	N	1
	MEAN	0.01
	STD	

'All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.[*]

LAKE MICHIGAN, FISH ISLAND

HERRING GULL		YEAR 84
DDE	N	1
	MEAN	8.5
	STD	
DDT	N	1
	MEAN	0.02
	STD	
DIELDRIN	N	1
	MEAN	0.38
	STD	
ALPHA-HEXACHLORO-CYCLOHEXANE	N	1
	MEAN	.0025
	STD	
BETA-HEXACHLORO-CYCLOHEXANE	N	1
	MEAN	.0025
	STD	
HEPTACHLOR EPOXIDE	N	1
	MEAN	0.18
	STD	
MIREX	N	1
	MEAN	0.04
	STD	
TRANS-NONACHLOR	N	1
	MEAN	0.03
	STD	
PCB 1260	N	1
	MEAN	32.1
	STD	

---

[*] All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.[*]

LAKE MICHIGAN, FISH ISLAND

HERRING GULL		YEAR
		84
PCB 1254:1260 (conversion to total PCB congener conc see pg. 39)	N	1
	MEAN	36.2
	STD	

---

[*] All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.[*]

LAKE MICHIGAN, GRAVEL ISLAND

HERRING GULL		YEAR
		84
PERCENT LIPID IN EGG	N	1
	MEAN	9.5
	STD	
ALPHA-CHLORDANE	N	1
	MEAN	0.04
	STD	
GAMMA-CHLORDANE	N	1
	MEAN	0.01
	STD	
OXY-CHLORDANE	N	1
	MEAN	0.45
	STD	
1234-CHLOROBENZENE	N	1
	MEAN	0.005
	STD	
1235-/ 1245-CHLOROBENZENE	N	1
	MEAN	0.005
	STD	
PENTA-CHLOROBENZENE	N	1
	MEAN	0.007
	STD	
HEXA-CHLOROBENZENE	N	1
	MEAN	0.06
	STD	
DDD	N	1
	MEAN	0.01
	STD	

[*] All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.[*]

LAKE MICHIGAN, GRAVEL ISLAND

HERRING GULL		YEAR 84
DDE	N	1
	MEAN	8.67
	STD	
DDT	N	1
	MEAN	0.04
	STD	
DIELDRIN	N	1
	MEAN	0.7
	STD	
HEPTACHLOR EPOXIDE	N	1
	MEAN	0.25
	STD	
ALPHA-HEXACHLORO-CYCLOHEXANE	N	1
	MEAN	.0025
	STD	
BETA-HEXACHLORO-CYCLOHEXANE	N	1
	MEAN	0.01
	STD	
MIREX	N	1
	MEAN	0.06
	STD	
TRANS-NONACHLOR	N	1
	MEAN	0.05
	STD	
PCB 1260	N	1
	MEAN	34.9
	STD	

---

[*] All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.[1]

LAKE MICHIGAN, GRAVEL ISLAND

HERRING GULL		YEAR
		84
PCB 1254:1260 (conversion to total PCB congener conc see pg. 39)	N	1
	MEAN	44.1
	STD	

---

[1] All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.[*]

LAKE MICHIGAN, SPIDER ISLAND

HERRING GULL		YEAR
		84
PERCENT LIPID IN EGG	N	1
	MEAN	7.7
	STD	
ALPHA-CHLORDANE	N	1
	MEAN	0.03
	STD	
GAMMA-CHLORDANE	N	1
	MEAN	0.01
	STD	
OXY-CHLORDANE	N	1
	MEAN	0.41
	STD	
1234-CHLOROBENZENE	N	1
	MEAN	0.002
	STD	
1235-/ 1245-CHLOROBENZENE	N	1
	MEAN	0.008
	STD	
PENTA-CHLOROBENZENE	N	1
	MEAN	0.005
	STD	
HEXA-CHLOROBENZENE	N	1
	MEAN	0.061
	STD	
DDD	N	1
	MEAN	0.01
	STD	

[*] All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.[*]

LAKE MICHIGAN, SPIDER ISLAND

HERRING GULL		YEAR
		84
DDE	N	1
	MEAN	7.16
	STD	
DDT	N	1
	MEAN	0.03
	STD	
DIELDRIN	N	1
	MEAN	0.46
	STD	
HEPTACHLOR EPOXIDE	N	1
	MEAN	0.22
	STD	
ALPHA-HEXACHLOROCYCLOHEXANE	N	1
	MEAN	.0025
	STD	
BETA-HEXACHLOROCYCLOHEXANE	N	1
	MEAN	0.01
	STD	
MIREX	N	1
	MEAN	0.02
	STD	
TRANS-NONACHLOR	N	1
	MEAN	0.04
	STD	
PCB 1260	N	1
	MEAN	31.2
	STD	

[*] All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.[1]

LAKE MICHIGAN, SPIDER ISLAND

HERRING GULL		YEAR
		84
PCB 1254:1260 (conversion to total PCB congener conc see pg. 39)	N	1
	MEAN	37.4
	STD	

[1] All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.*

LAKE MICHIGAN, GRAVELLY ISLAND

CASPIAN TERN		YEAR
		80
PERCENT LIPID IN EGG	N	10
	MEAN	7.76
	STD	.6786
1234-CHLOROBENZENE	N	10
	MEAN	.0188
	STD	.0514
1235-/ 1245-CHLOROBENZENE	N	10
	MEAN	.0235
	STD	.0705
PENTA-CHLOROBENZENE	N	10
	MEAN	.1645
	STD	.5146
HEXA-CHLOROBENZENE	N	10
	MEAN	.1546
	STD	.3778
DDE	N	10
	MEAN	8.762
	STD	4.951
MIREX	N	10
	MEAN	0.055
	STD	.0127
PCB 1260	N	10
	MEAN	34.3
	STD	8.711
PCB 1254:1260 (conversion to total PCB congener conc see pg. 39)	N	10
	MEAN	36.16
	STD	9.179

---

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.[*]

LAKE MICHIGAN, LITTLE SISTER ISLAND

HERRING GULL		YEAR
		77
PERCENT LIPID IN EGG	N	10
	MEAN	9.96
	STD	.9812
ARSENIC	N	1
	MEAN	0.015
	STD	
CADMIUM	N	1
	MEAN	0.017
	STD	
ALPHA-CHLORDANE	N	10
	MEAN	0.143
	STD	.0495
OXY-CHLORDANE	N	10
	MEAN	1.028
	STD	.3256
HEXA-CHLOROBENZENE	N	10
	MEAN	.2565
	STD	.1034
DDD	N	10
	MEAN	0.364
	STD	.0963
DDE	N	10
	MEAN	30.59
	STD	12.58
DDT	N	10
	MEAN	.3077
	STD	.1964

[*] All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.[*]

LAKE MICHIGAN, LITTLE SISTER ISLAND

HERRING GULL		YEAR 77
DIELDRIN	N	10
	MEAN	0.646
	STD	.2114
HEPTACHLOR EPOXIDE	N	10
	MEAN	0.278
	STD	.0853
BETA-HEXACHLORO-CYCLOHEXANE	N	10
	MEAN	0.02
	STD	.0141
LEAD	N	1
	MEAN	0.051
	STD	
MIREX	N	10
	MEAN	0.07
	STD	.0416
PHOTOMIREX	N	10
	MEAN	0.039
	STD	.0179
PCB 1260	N	10
	MEAN	89.99
	STD	27.07
PCB 1254:1260 (conversion to total PCB congener conc see pg. 39)	N	10
	MEAN	104.4
	STD	32.41
SELENIUM	N	1
	MEAN	1.3
	STD	

---

[*] All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.*

LAKE MICHIGAN, BIG SISTER ISLAND

HERRING GULL		YEAR													
		71	72	73	74	76	77	78	79	80	82	83	84	85	86
PERCENT LIPID IN EGG	N	9	1	10	1	10	1	10	10	10	10	10	10	10	1
	MEAN	7.511	7.8	7.12	8.3	8.9	8.1	9.12	9.99	8.31	8.94	9.03	9.02	9.89	10
	STD	.6936		.6477		1.282		1.388	2.04	0.978	1.088	.8111	.9555	.3446	
ALPHA-CHLORDANE	N					10		10	10	10	10	10	10	10	1
	MEAN					0.213		0.232	0.193	0.13	0.026	0.019	0.04	0.041	0.014
	STD					.0769		.1729	.1505	.0429	.0097	.0032	.0094	.0099	
GAMMA-CHLORDANE	N										10	10	10	10	
	MEAN										.0105	.0035	.0095	0.013	
	STD										.0037	.0013	.0016	.0067	
OXY-CHLORDANE	N	10		10		10		10	10	10	10	10	10	10	1
	MEAN	0.62		0.723		0.648		0.561	0.518	0.609	0.879	0.487	0.429	0.34	0.292
	STD	.2704		.3351		.2371		.3903	.2616	.2731	0.523	0.178	.1818	.1732	
1234-CHLOROBENZENE	N	10		10		10				10	10	10	10	10	
	MEAN	.0298		.0046		.0158				.0008	0.002	.0013	0.01	.0221	
	STD	.0503		.0064		.0262				.0008	.0007	.0008	.0191	.0505	
1235-/ 1245-CHLOROBENZENE	N	10		10		10				10	10	10	10	10	
	MEAN	.0142		.0024		.0057				0.001	.0044	.0022	.0012	.0026	
	STD	.0171		.0042		.0089				.0014	.0021	.0018	.0021	.0048	
PENTA-CHLOROBENZENE	N	10		10		10				10	10	10	10	10	
	MEAN	.0736		.0131		.0191				0.006	.0051	.0032	0.007	.0048	
	STD	.1187		.0139		.0217				.0014	.0021	.0009	.0073	.0059	
HEXA-CHLOROBENZENE	N	10		10		10		10	10	10	10	10	10	10	1
	MEAN	.4233		.1058		.1417		0.121	0.132	.0841	.0665	.0316	.0618	.0488	0.065
	STD	.6307		.0477		.0598		.0515	.0747	.0234	.0178	0.007	.0178	.0337	
DDD	N	10		10		10			10	10	9	10	10	10	1
	MEAN	0.159		0.103		0.25			0.214	0.192	.0489	0.017	0.022	0.046	0.013
	STD	.0567		.0552		.1246			.1479	0.041	.0285	.0082	.0103	.0107	

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.*

LAKE MICHIGAN, BIG SISTER ISLAND

HERRING GULL		YEAR													
		71	72	73	74	76	77	78	79	80	82	83	84	85	86
DDE	N	10		10		10		10	10	10	10	10	10	10	1
	MEAN	60.98		54.36		33.4		21.8	11.79	11.38	17.89	6.761	9.338	7.934	7.05
	STD	33.79		15.99		10.34		8.001	6.082	2.606	5.808	1.767	4.054	7.445	
DDT	N	10		10		10		10	10	10	10	10	10	10	1
	MEAN	0.983		0.696		0.272		0.144	0.09	0.169	0.077	0.022	0.06	0.102	0.081
	STD	.4331		.2066		.1855		0.049	.0678	.0468	.0177	.0063	.0254	0.023	
DIELDRIN	N	10		10		10		10	10	10	10	10	10	10	1
	MEAN	0.832		0.593		0.82		0.904	0.544	0.654	0.747	0.529	0.639	0.536	0.281
	STD	.3813		.3482		.3531		.5749	.3157	.2193	.3793	0.142	.2331	.1519	
2378-TETRACHLORO-DIBENZO-P-DIOXIN	N	1	1	1	1	1	1			1	1		1	1	1
	MEAN	249	70	58	40	54	60			24	45		18	14	17
	STD														
12378-PENTACHLORO-DIBENZO-P-DIOXIN	N	1	1	1	1	1	1			1	1		1	1	1
	MEAN	38	31	28	25	31	25			17	20		20	13	23
	STD														
123678-HEXACHLORO-DIBENZO-P-DIOXIN	N	1	1	1	1	1	1			1	1		1	1	1
	MEAN	69	52	53	40	47	45			23	31		23	19	33
	STD														
1234678-HEPTACHLORO-DIBENZO-P-DIOXIN	N	1	1	1	1	1	1			1	1		1	1	1
	MEAN	12	6	9	5	6	7			6	6		ND	6	6
	STD														
OCTACHLORO-DIBENZO-P-DIOXIN	N	1	1	1	1	1	1			1	1		1	1	1
	MEAN	40	109	92	36	39	62			31	31		21	10	10
	STD														
2378-TETRACHLORO-DIBENZOFURAN	N	1	1	1	1	1	1			1	1		1	1	1
	MEAN	2	2	3	2	3	2			3	3		8	2	2
	STD														

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.[*]

LAKE MICHIGAN, BIG SISTER ISLAND

HERRING GULL		YEAR													
		71	72	73	74	76	77	78	79	80	82	83	84	85	86
23478-PENTACHLORO-DIBENZOFURAN	N	1	1	1	1	1	1			1	1		1	1	1
	MEAN	23	22	16	15	15	12			13	11		21	9	9
	STD														
123478-/123467-HEXACHLORO-DIBENZOFURAN	N	1	1	1	1	1	1			1	1		1	1	1
	MEAN	4	ND	ND	4	4	4			4	4		4	4	4
	STD														
123678-HEXACHLORO-DIBENZOFURAN	N	1	1	1	1	1	1			1	1		1	1	1
	MEAN	5	6	4	5	4	4			4	5		4	4	4
	STD														
HEPTACHLOR EPOXIDE	N	10		10		10		10	8	10	10	10	10	10	1
	MEAN	0.391		0.418		0.401		0.322	0.245	0.359	0.383	0.201	0.304	0.236	0.24
	STD	.1554		.1259		.1211		.1269	.1215	.0956	.1451	.0605	0.094	.0578	
ALPHA-HEXACHLORO-CYCLOHEXANE	N										10	10	10	10	
	MEAN										.0038	.0055	0.005	.0085	
	STD										.0013	.0026	0	.0078	
BETA-HEXACHLORO-CYCLOHEXANE	N	10		10		10		10	10	10	10	10	10	10	1
	MEAN	0.026		0.01		0.016		0.023	0.021	.0067	.0105	.0058	0.01	.0115	.0005
	STD	.0241		0		.0097		.0157	.0247	.0045	.0037	.0031	0	.0103	
TOTAL MERCURY	N										10	10		10	
	MEAN										0.37	0.168		0.134	
	STD										.1702	.0408		.0395	
MIREX	N	10		10		10		10	10	10	10	10	10	10	1
	MEAN	0.679		0.214		0.357		0.256	0.312	0.068	0.07	0.044	0.133	0.182	0.052
	STD	1.437		.3111		0.54		.2483	.4932	.0439	.0287	.0389	.2422	.4737	
PHOTOMIREX	N							10	10						1
	MEAN							0.096	0.137						.0005
	STD							.0837	.2205						

[*] All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.*

LAKE MICHIGAN, BIG SISTER ISLAND

HERRING GULL		YEAR												
		71	72	73	74	76	77	78	79	80	82	83	84	85	86
CIS-NONACHLOR	N														1
	MEAN														0.069
	STD														
TRANS-NONACHLOR	N										10	10	10	10	1
	MEAN										0.034	0.026	0.03	0.029	0.123
	STD										.0107	0.007	.0105	.0099	
OCTACHLORO-STYRENE	N										1				
	MEAN										1.58				
	STD														
PCB 1260	N	10		10		10		10	10	10	10	10	10		1
	MEAN	134.1		155.8		110.1		70.49	69.81	50.79	57.57	24.21	29.4		9.18
	STD	64.42		51.28		26.4		26.92	35.91	10.38	16.63	8.295	9.51		
PCB 1254:1260 (conversion to total PCB congener conc see pg. 39)	N	10		10		10		10	10	10	10	10	10	10	1
	MEAN	141.7		165.3		118.4		89.98	73.49	56.95	66.89	27.66	34	36.82	27
	STD	64.04		50.23		28.29		36.78	36.87	12.06	23.38	9.481	11.15	37.21	

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.[*]

LAKE MICHIGAN, BIG SISTER ISLAND

HERRING GULL		YEAR	
		87	88
PERCENT LIPID IN EGG	N	1	1
	MEAN	10.45	7.74
	STD		
ALPHA-CHLORDANE	N	1	1
	MEAN	.0258	.0095
	STD		
GAMMA-CHLORDANE	N	1	1
	MEAN	.0013	.0004
	STD		
OXY-CHLORDANE	N	1	1
	MEAN	.5388	.1445
	STD		
1234-CHLOROBENZENE	N	1	1
	MEAN	.0169	.0111
	STD		
1235-/ 1245-CHLOROBENZENE	N	1	1
	MEAN	.0247	.0164
	STD		
PENTA-CHLOROBENZENE	N	1	1
	MEAN	.0028	.0054
	STD		
HEXA-CHLOROBENZENE	N	1	1
	MEAN	.0749	.0337
	STD		
DDD	N	1	1
	MEAN	.0221	.0071
	STD		

---

[*] All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.[*]

LAKE MICHIGAN, BIG SISTER ISLAND

HERRING GULL		YEAR	
		87	88
DDE	N	1	1
	MEAN	12.31	3.966
	STD		
DDT	N	1	1
	MEAN	.1338	.0467
	STD		
DIELDRIN	N	1	1
	MEAN	.8502	.5551
	STD		
2378-TETRACHLORO-DIBENZO-P-DIOXIN	N	1	1
	MEAN	26	10
	STD		
12378-PENTACHLORO-DIBENZO-P-DIOXIN	N	1	1
	MEAN	21	9
	STD		
123678-HEXACHLORO-DIBENZO-P-DIOXIN	N	1	1
	MEAN	29	15
	STD		
1234678-HEPTACHLORO-DIBENZO-P-DIOXIN	N	1	1
	MEAN	6	3
	STD		
OCTACHLORO-DIBENZO-P-DIOXIN	N	1	1
	MEAN	10	5
	STD		
2378-TETRACHLORO-DIBENZOFURAN	N	1	
	MEAN	3	
	STD		

[*] All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.'

LAKE MICHIGAN, BIG SISTER ISLAND

HERRING GULL		YEAR	
		87	88
23478-PENTACHLORO-DIBENZOFURAN	N	1	1
	MEAN	11	8
	STD		
123478-/ 123467-HEXACHLORO-DIBENZOFURAN	N	1	1
	MEAN	4	ND
	STD		
123678-HEXACHLORO-DIBENZOFURAN	N	1	1
	MEAN	4	ND
	STD		
HEPTACHLOR EPOXIDE	N	1	1
	MEAN	.6078	.2015
	STD		
ALPHA-HEXACHLORO-CYCLOHEXANE	N	1	1
	MEAN	.0022	.0009
	STD		
BETA-HEXACHLORO-CYCLOHEXANE	N	1	1
	MEAN	.0051	.0012
	STD		
GAMMA-HEXACHLORO-CYCLOHEXANE	N	1	1
	MEAN	0.002	.0008
	STD		
TOTAL MERCURY	N		
	MEAN		
	STD		
MIREX	N	1	1
	MEAN	.0961	.0348
	STD		

'All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.[1]

LAKE MICHIGAN, BIG SISTER ISLAND

HERRING GULL		YEAR 87	YEAR 88
PHOTOMIREX	N	1	1
	MEAN	.0475	.0191
	STD		
CIS-NONACHLOR	N	1	1
	MEAN	.1134	0.047
	STD		
TRANS-NONACHLOR	N	1	1
	MEAN	.1701	0.074
	STD		
OCTACHLORO-STYRENE	N	1	1
	MEAN	.0086	.0045
	STD		
PCB 1260	N	1	1
	MEAN	15.05	5.637
	STD		
PCB 1254:1260 (conversion to total PCB congener conc see pg. 39)	N	1	1
	MEAN	44.52	16.61
	STD		

---

[1] All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.[*]

LAKE MICHIGAN, GREEN BAY, HAT ISLAND

HERRING GULL		YEAR 84
PERCENT LIPID IN EGG	N	1
	MEAN	8.7
	STD	
ALPHA-CHLORDANE	N	1
	MEAN	0.02
	STD	
GAMMA-CHLORDANE	N	1
	MEAN	0.005
	STD	
OXY-CHLORDANE	N	1
	MEAN	0.39
	STD	
1234-CHLOROBENZENE	N	1
	MEAN	0.001
	STD	
1235-/ 1245-CHLOROBENZENE	N	1
	MEAN	0.005
	STD	
PENTA-CHLOROBENZENE	N	1
	MEAN	0.006
	STD	
HEXA-CHLOROBENZENE	N	1
	MEAN	0.053
	STD	
DDD	N	1
	MEAN	0.01
	STD	

[*] All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.*

LAKE MICHIGAN, GREEN BAY, HAT ISLAND

HERRING GULL		YEAR
		84
DDE	N	1
	MEAN	7.14
	STD	
DDT	N	1
	MEAN	0.03
	STD	
DIELDRIN	N	1
	MEAN	0.49
	STD	
HEPTACHLOR EPOXIDE	N	1
	MEAN	0.22
	STD	
ALPHA-HEXACHLOROCYCLOHEXANE	N	1
	MEAN	.0025
	STD	
BETA-HEXACHLOROCYCLOHEXANE	N	1
	MEAN	0.01
	STD	
MIREX	N	1
	MEAN	0.04
	STD	
TRANS-NONACHLOR	N	1
	MEAN	0.03
	STD	
PCB 1260	N	1
	MEAN	25.5
	STD	

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.*

LAKE MICHIGAN, GREEN BAY, HAT ISLAND

HERRING GULL		YEAR
		84
PCB 1254:1260 (conversion to total PCB congener conc see pg. 39)	N	1
	MEAN	35.3
	STD	

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.[*]

LAKE SUPERIOR, CHENE ISLAND

HERRING GULL		YEAR
		83
PERCENT LIPID IN EGG	N	1
	MEAN	8.5
	STD	
OXY-CHLORDANE	N	1
	MEAN	0.134
	STD	
HEXA-CHLOROBENZENE	N	1
	MEAN	0.053
	STD	
DDD	N	1
	MEAN	0.018
	STD	
DDE	N	1
	MEAN	2.74
	STD	
DIELDRIN	N	1
	MEAN	0.247
	STD	
HEPTACHLOR EPOXIDE	N	1
	MEAN	0.133
	STD	
MIREX	N	1
	MEAN	0.126
	STD	
PCB 1254:1260 (conversion to total PCB congener conc see pg. 39)	N	1
	MEAN	14.5
	STD	

---

[*] All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.[*]

LAKE SUPERIOR, MAMMAINSE HARBOUR

HERRING GULL		YEAR			
		74	75	77	78
PERCENT LIPID IN EGG	N	10	10	10	8
	MEAN	8.68	7.24	9.25	9.263
	STD	1.005	1.403	.9144	.8141
ALPHA-CHLORDANE	N			10	5
	MEAN			0.031	0.068
	STD			.0218	.0858
OXY-CHLORDANE	N			10	8
	MEAN			.3530	.3675
	STD			.0874	.3819
HEXA-CHLOROBENZENE	N	10	10	10	8
	MEAN	.2869	.2356	.1340	.0875
	STD	.1287	.0817	.0631	.0489
DDD	N	10	10	10	
	MEAN	.2828	.1141	.2140	
	STD	.0659	.0577	.1431	
DDE	N	10	10	10	8
	MEAN	14.19	22.03	12.01	9.683
	STD	4.115	8.601	4.269	4.782
DDT	N	10	10	10	8
	MEAN	.8435	.7219	0.072	.0975
	STD	.4802	.6690	.0545	.1004
DIELDRIN	N	10	10	10	8
	MEAN	0.419	0.319	0.403	.3975
	STD	.1489	.1081	.1702	.4333
HEPTACHLOR EPOXIDE	N	10	10	10	8
	MEAN	0.126	0.136	0.128	0.135
	STD	.0201	.0552	.0416	0.067

---

[*] All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.*

LAKE SUPERIOR, MAMMAINSE HARBOUR

HERRING GULL		YEAR			
		74	75	77	78
BETA-HEXACHLORO-CYCLOHEXANE	N			10	8
	MEAN			0.025	.0213
	STD			.0201	.0155
TOTAL MERCURY	N	10	10		
	MEAN	0.368	0.396		
	STD	.0727	.1388		
MIREX	N	10	10	10	8
	MEAN	0.759	1.292	0.415	.1456
	STD	0.665	1.721	.7906	.1565
PHOTOMIREX	N			10	8
	MEAN			0.179	.0613
	STD			.2823	.0484
PCB 1260	N	10	10	10	8
	MEAN	37.32	54.29	46.52	31.1
	STD	7.441	29.28	15.46	13.05
PCB 1254:1260 (conversion to total PCB congener conc see pg. 39)	N	10	10	10	8
	MEAN	50.07	70.45	55.53	36.85
	STD	9.984	37.47	20.22	15.78

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.[*]

LAKE SUPERIOR, AGAWA ROCK

HERRING GULL		YEAR										
		78	79	80	81	82	83	84	85	86	87	88
PERCENT LIPID IN EGG	N	10	10	10	10	10	12	10	10	1	1	1
	MEAN	9.74	9.29	8.32	8.91	8.9	8.933	9.3	9.66	7.8	9.2	9.6
	STD	1.139	0.74	.7068	1.121	1.231	.6867	.7528	.7834			
ALPHA-CHLORDANE	N	7	10	9	10	7	11	10	10	1	1	1
	MEAN	0.12	0.152	.0867	0.204	.0229	.0141	0.019	0.015	0.006	.0016	.0146
	STD	.0872	0.06	.0132	.0643	.0138	.0058	.0088	.0053			
GAMMA-CHLORDANE	N				1	10	11	10	10		1	1
	MEAN				0.04	0.009	.0039	0.028	.0045		.0016	.0013
	STD					.0021	.0013	.0197	.0011			
OXY-CHLORDANE	N	10	10	10	10	10	12	10	10	1	1	1
	MEAN	0.277	0.438	0.23	0.28	0.336	.2678	0.208	0.199	0.219	0.172	.1628
	STD	.1676	.3346	.2529	.1511	.1794	0.114	.0567	.1124			
123-CHLOROBENZENE	N		10									
	MEAN		0.001									
	STD		0									
124-CHLOROBENZENE	N		10									
	MEAN		.0049									
	STD		.0027									
135-CHLOROBENZENE	N		10									
	MEAN		0.001									
	STD		0									
1234-CHLOROBENZENE	N		10	10	10	10	11	10	10		1	1
	MEAN		.0077	.0069	.0057	.0081	0.002	.0094	.0007		.0176	.0175
	STD		0.005	0.007	.0063	.0129	.0019	.0234	.0004			
1235-/ 1245-CHLOROBENZENE	N		10	10	10	10	11	10	10		1	1
	MEAN		.0127	.0056	.0049	.0046	.0023	.0038	.0012		.0266	.0237
	STD		.0088	.0024	.0048	.0038	.0022	0.005	.0013			

---

[*] All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.[*]

LAKE SUPERIOR, AGAWA ROCK

HERRING GULL		YEAR										
		78	79	80	81	82	83	84	85	86	87	88
PENTA-CHLOROBENZENE	N		10	10	10	10	11	10	10		1	1
	MEAN		.0219	.0098	.0136	.0099	.0038	0.007	.0044		.0097	.0103
	STD		.0145	.0043	.0104	.0034	0.003	.0061	.0056			
HEXA-CHLOROBENZENE	N	10	10	10	10	10	12	10	10	1	1	1
	MEAN	0.105	0.142	.0802	.1413	.0956	.0545	0.055	.0478	0.048	.0378	.0474
	STD	.0617	0.077	.0198	.0866	.0284	.0589	.0206	.0075			
DDD	N		10	10	10	10	12	10	10	1	1	1
	MEAN		0.183	0.106	0.066	0.133	.0155	0.017	0.016	.0005	.0035	0.007
	STD		0.093	.0515	.0288	.0658	.0085	.0175	.0052			
DDE	N	10	10	10	10	10	12	10	10	1	1	1
	MEAN	8.459	7.264	3.702	6.256	5.831	3.238	2.485	2.965	3.13	2.15	2.708
	STD	4.953	5.408	3.545	3.087	2.188	1.079	.8452	0.705			
DDT	N	10	10	10	10	10	11	10	10	1	1	1
	MEAN	0.1	0.086	0.154	0.054	0.107	.0245	0.015	0.07	0.075	.0332	.0963
	STD	0.044	.0443	.1343	0.025	.0514	.0197	.0053	.0163			
DIELDRIN	N	10	10	10	10	10	12	10	10	1	1	1
	MEAN	0.422	0.559	0.351	0.494	0.344	.3288	0.34	0.356	0.316	.1286	.3737
	STD	.1812	.3131	.2088	.3158	.1541	.1245	0.08	0.117			
2378-TETRACHLORO-DIBENZO-P-DIOXIN	N				1	1	1	1	1	1	1	1
	MEAN				79	51	13	18	16	28	37	19
	STD											
12378-PENTACHLORO-DIBENZO-P-DIOXIN	N				1	1	1	1	1	1	1	1
	MEAN				21	18	8	10	13	17	5	12
	STD											
123678-HEXACHLORO-DIBENZO-P-DIOXIN	N				1	1	1	1	1	1	1	1
	MEAN				30	24	8	10	10	14	10	12
	STD											

---

[*] All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.[*]

LAKE SUPERIOR, AGAWA ROCK

HERRING GULL		YEAR										
		78	79	80	81	82	83	84	85	86	87	88
1234678-HEPTACHLORO-DIBENZO-P-DIOXIN	N				1	1	1	1	1	1	1	1
	MEAN				8	8	8	5	6	6	6	2
	STD											
OCTACHLORO-DIBENZO-P-DIOXIN	N				1	1	1	1	1	1	1	1
	MEAN				14	30	10	7	10	10	10	3
	STD											
2378-TETRACHLORO-DIBENZOFURAN	N							1	1	1	1	1
	MEAN							5	2	2	2	2
	STD											
23478-PENTACHLORO-DIBENZOFURAN	N							1	1	1	1	1
	MEAN							17	3	14	6	12
	STD											
123478-/ 123467-HEXACHLORO-DIBENZOFURAN	N							1	1	1	1	1
	MEAN							4	4	4	ND	2
	STD											
123678-HEXACHLORO-DIBENZOFURAN	N							1	1	1	1	1
	MEAN							4	4	4	ND	2
	STD											
HEPTACHLOR EPOXIDE	N	10	6	10	10	10	12	10	10	1	1	1
	MEAN	0.158	.1483	0.12	0.192	0.173	.1154	0.108	0.136	0.184	.1135	.1849
	STD	.0805	.0523	.0643	.0948	.0668	.0558	.0278	.0409			
ALPHA-HEXACHLORO-CYCLOHEXANE	N						11	10	10		1	1
	MEAN						0.007	0.004	0.005		.0025	.0026
	STD						.0035	.0013	0			
BETA-HEXACHLORO-CYCLOHEXANE	N	10	10	10	10	10	11	10	10	1	1	1
	MEAN	0.029	0.026	0.012	0.019	.0161	0.01	.0102	.0065	.0005	.0031	.0032
	STD	.0264	.0178	.0042	.0166	.0083	.0073	.0042	.0024			

[*] All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.*

LAKE SUPERIOR, AGAWA ROCK

HERRING GULL		YEAR										
		78	79	80	81	82	83	84	85	86	87	88
GAMMA-HEXACHLORO-CYCLOHEXANE	N										1	1
	MEAN										.0021	.0024
	STD											
TOTAL MERCURY	N				10	10	11		10			
	MEAN				0.264	0.592	.2818		0.219			
	STD				.0734	.1383	.1226		.0771			
MIREX	N	10	10	10	10	10	12	10	10	1	1	1
	MEAN	0.274	0.328	0.173	0.197	0.512	.1522	0.194	0.12	0.121	0.16	.0861
	STD	.2639	.4421	.1055	.3486	.5173	.0514	.2759	.1277			
PHOTOMIREX	N	10	10							1	1	1
	MEAN	.1015	0.137							0.059	.0465	.0425
	STD	.0987	.1824									
CIS-NONACHLOR	N									1	1	1
	MEAN									0.067	.0378	.0614
	STD											
TRANS-NONACHLOR	N					10	11	10	10	1	1	1
	MEAN					0.155	0.033	.0115	0.013	0.097	.0374	.0949
	STD					.0824	.0341	.0047	.0063			
OCTACHLORO-STYRENE	N										1	1
	MEAN										.0103	0.008
	STD											
PCB 1260	N	10	10	10	10	10	11	10		1	1	1
	MEAN	31.07	50.45	20.05	32.96	26.61	18.45	13.49		5	4.737	3.872
	STD	18.83	27.61	9.689	16.19	7.213	17.03	4.419				
PCB 1254:1260 (conversion to total PCB congener conc see pg. 39)	N	10	10	10	10	10	12	10	10	1	1	1
	MEAN	37.88	58.43	23.68	36.35	29.78	21.07	16.01	12.26	13.9	11.29	11.32
	STD	22.85	33.07	12.17	17.76	8.374	18.71	5.411	2.569			

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.[*]

LAKE SUPERIOR, LEADMAN ISLANDS

HERRING GULL		YEAR 83
PERCENT LIPID IN EGG	N	1
	MEAN	8.5
	STD	
OXY-CHLORDANE	N	1
	MEAN	0.228
	STD	
HEXA-CHLOROBENZENE	N	1
	MEAN	0.07
	STD	
DDD	N	1
	MEAN	0.047
	STD	
DDE	N	1
	MEAN	4
	STD	
DIELDRIN	N	1
	MEAN	0.46
	STD	
HEPTACHLOR EPOXIDE	N	1
	MEAN	0.159
	STD	
MIREX	N	1
	MEAN	0.244
	STD	
PCB 1254:1260 (conversion to total PCB congener conc see pg. 39)	N	1
	MEAN	20
	STD	

---

[*] All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.[*]

LAKE SUPERIOR, HURON ISLAND

HERRING GULL		YEAR 83
PERCENT LIPID IN EGG	N	1
	MEAN	7.4
	STD	
OXY-CHLORDANE	N	1
	MEAN	0.194
	STD	
HEXA-CHLOROBENZENE	N	1
	MEAN	0.049
	STD	
DDD	N	1
	MEAN	0.022
	STD	
DDE	N	1
	MEAN	3.48
	STD	
DIELDRIN	N	1
	MEAN	0.32
	STD	
HEPTACHLOR EPOXIDE	N	1
	MEAN	0.155
	STD	
MIREX	N	1
	MEAN	0.146
	STD	
PCB 1254:1260 (conversion to total PCB congener conc see pg. 39)	N	1
	MEAN	15.7
	STD	

---

[*] All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.[*]

LAKE SUPERIOR, LAKE LINDEN

HERRING GULL		YEAR
		83
PERCENT LIPID IN EGG	N	1
	MEAN	7.2
	STD	
OXY-CHLORDANE	N	1
	MEAN	0.228
	STD	
HEXA-CHLOROBENZENE	N	1
	MEAN	0.041
	STD	
DDD	N	1
	MEAN	0.014
	STD	
DDE	N	1
	MEAN	3.78
	STD	
DIELDRIN	N	1
	MEAN	0.301
	STD	
HEPTACHLOR EPOXIDE	N	1
	MEAN	0.167
	STD	
MIREX	N	1
	MEAN	0.093
	STD	
PCB 1254:1260 (conversion to total PCB congener conc see pg. 39)	N	1
	MEAN	15.1
	STD	

[*] All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.[*]

LAKE SUPERIOR, GRANITE ISLAND

HERRING GULL		YEAR												
		73	74	76	78	79	80	81	82	84	85	86	87	88
PERCENT LIPID IN EGG	N	2	9	10	10	10	10	10	10	10	10	1	1	1
	MEAN	7.75	8.789	9.55	9.72	9.24	6.85	8.44	8.45	9.74	9.4	7.4	8.9	9
	STD	.9192	.8507	.9083	.4417	1.716	1.06	1.047	1.185	1.02	.5207			
ALPHA-CHLORDANE	N			10	2	10	10	10	9	10	10	1	1	1
	MEAN			0.02	0.07	0.169	0.121	0.221	.0156	0.018	0.03	0.008	.0107	.0138
	STD			.0067	0	0.061	.0498	.0553	.0053	.0079	.0082			
GAMMA-CHLORDANE	N							8	10	10	10		1	1
	MEAN							.0689	.0095	.0273	.0097		.0016	.0012
	STD							.0495	.0016	.0189	.0045			
OXY-CHLORDANE	N			10	10	10	10	10	10	10	10	1	1	1
	MEAN			0.063	0.255	0.406	0.177	0.197	0.335	0.179	0.18	0.238	.1864	.2291
	STD			.0331	.1322	.2902	.0833	.0763	.1531	.0438	.0492			
123-CHLOROBENZENE	N					10								
	MEAN					0.001								
	STD					0								
124-CHLOROBENZENE	N					10								
	MEAN					.0054								
	STD					.0023								
135-CHLOROBENZENE	N					10								
	MEAN					0.001								
	STD					0								
1234-CHLOROBENZENE	N					10	10	10	10	10	10		1	1
	MEAN					.0072	.0096	.0232	.0042	.0029	.0724		.0176	.0169
	STD					.0095	.0179	.0702	.0047	.0074	.0819			
1235-/ 1245-CHLOROBENZENE	N					10	10	10	10	10	10		1	1
	MEAN					.0096	.0069	.0092	.0049	.0005	.0043		0.026	.0248
	STD					.0069	.0077	.0223	.0028	0	.0063			

---

[*] All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.'

LAKE SUPERIOR, GRANITE ISLAND

HERRING GULL		YEAR												
		73	74	76	78	79	80	81	82	84	85	86	87	88
PENTA-CHLOROBENZENE	N					10	10	10	10	10	10		1	1
	MEAN					.0158	.0097	.0119	.0098	.0025	.0124		.0094	.0093
	STD					.0113	.0079	.0158	.0091	.0022	0.013			
HEXA-CHLOROBENZENE	N	2	9	10	10	10	10	10	10	10	10	1	1	1
	MEAN	0.228	.2196	0.05	0.138	0.145	.0768	.0913	.0738	.0462	.0608	0.047	0.038	.0459
	STD	.0537	.1232	.0684	.0575	.0602	.0256	.0227	0.015	.0149	.0199			
DDD	N	2	9	10		10	10	10	10	10	10	1	1	1
	MEAN	.0245	.4418	.0494		0.195	0.11	.0391	0.098	0.009	0.032	.0005	.0035	.0029
	STD	.0247	.0875	0.067		0.065	.0279	.0237	.0494	.0021	.0092			
DDE	N	2	9	10	10	10	10	10	10	10	10	1	1	1
	MEAN	23.7	19.26	14.13	9.608	6.393	3.646	5.231	6.749	3.403	3.295	3.3	2.897	3.168
	STD	3.96	6.993	5.24	3.349	3.662	.9891	.9275	4.747	.9105	1.843			
DDT	N	2	9	10	10	10	10	10	10	10	10	1	1	1
	MEAN	.3230	.8274	.0808	0.12	0.094	0.127	0.024	0.155	0.02	0.044	0.085	0.075	0.072
	STD	.2418	.4438	.0876	0.051	.0589	.0525	.0135	.0726	.0094	.0267			
DIELDRIN	N	2	9	10	10	10	10	10	10	10	10	1	1	1
	MEAN	0.27	.6133	0.486	0.389	0.642	0.334	0.383	0.435	0.371	0.275	0.366	.2638	.3101
	STD	.1414	.1695	.1772	.1731	.5345	.1155	.1933	.2306	.1445	.0954			
2378-TETRACHLORO-DIBENZO-P-DIOXIN	N									1	1	1	1	1
	MEAN									14	19	18	16	16
	STD													
12378-PENTACHLORO-DIBENZO-P-DIOXIN	N									1	1	1	1	1
	MEAN									13	12	12	9	13
	STD													
123678-HEXACHLORO-DIBENZO-P-DIOXIN	N									1	1	1	1	1
	MEAN									14	15	15	10	15
	STD													

'All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.*

LAKE SUPERIOR, GRANITE ISLAND

HERRING GULL		YEAR												
		73	74	76	78	79	80	81	82	84	85	86	87	88
1234678-HEPTACHLORO-DIBENZO-P-DIOXIN	N									1	1	1	1	1
	MEAN									5	5	6	6	4
	STD													
OCTACHLORO-DIBENZO-P-DIOXIN	N									1	1	1	1	1
	MEAN									10	10	10	ND	2
	STD													
2378-TETRACHLORO-DIBENZOFURAN	N									1	1	1	1	1
	MEAN									3	2	2	2	1
	STD													
23478-PENTACHLORO-DIBENZOFURAN	N									1	1	1	1	1
	MEAN									21	9	8	7	10
	STD													
123478-/123467-HEXACHLORO-DIBENZOFURAN	N									1	1	1	1	1
	MEAN									3	4	4	4	ND
	STD													
123678-HEXACHLORO-DIBENZOFURAN	N									1	1	1	1	1
	MEAN									4	4	4	4	ND
	STD													
HEPTACHLOR EPOXIDE	N	2	9	10	10	9	10	9	10	10	10	1	1	1
	MEAN	0.035	.1878	0.175	0.176	.1989	0.155	.1444	0.201	0.13	0.151	0.216	.1896	.1985
	STD	.0354	.0624	.0698	.0602	.0417	.0597	.0573	.0896	.0298	.0341			
ALPHA-HEXACHLORO-CYCLOHEXANE	N								10	10	10		1	1
	MEAN								.0032	.0025	.0055		.0025	.0023
	STD								.0012	0	.0016			
BETA-HEXACHLORO-CYCLOHEXANE	N			6	10	10	9	10	10	10	10	1	1	1
	MEAN			0.02	0.024	0.019	.0084	0.016	.0212	.0048	0.011	.0005	.0031	.0028
	STD			.0155	.0184	.0074	.0089	.0084	.0149	.0036	.0032			

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.*

LAKE SUPERIOR, GRANITE ISLAND

HERRING GULL		YEAR												
		73	74	76	78	79	80	81	82	84	85	86	87	88
GAMMA-HEXACHLORO-CYCLOHEXANE	N												1	1
	MEAN												.0021	.0018
	STD													
TOTAL MERCURY	N	2	9	10				10	10		10			
	MEAN	0.42	.3544	0.3				0.355	0.405		0.201			
	STD	.0283	0.12	0.066				.0809	.1141		.0461			
MIREX	N		9	10	10	10	10	10	10	10	10	1	1	1
	MEAN		1.347	.0473	0.386	0.192	0.091	0.09	0.22	0.048	0.09	0.09	.0314	.0335
	STD		.7252	.0694	.4797	0.154	.1091	.0641	.2977	.0512	.0447			
PHOTOMIREX	N				10	10						1	1	1
	MEAN				0.155	0.086						0.046	.0175	.0104
	STD				0.19	.0611								
CIS-NONACHLOR	N											1	1	1
	MEAN											0.067	0.058	.0645
	STD													
TRANS-NONACHLOR	N								10	10	10	1	1	1
	MEAN								0.086	0.019	0.026	0.132	.0928	0.828
	STD								.0981	0.011	.0084			
OCTACHLORO-STYRENE	N												1	1
	MEAN												.0103	.0075
	STD													
PCB 1260	N	2	9	10	10	10	10	10	10	10		1	1	1
	MEAN	49.1	56.23	14.94	33.25	50.21	24.14	27.83	33.52	15.32		4.93	5.035	6.042
	STD	9.899	13.22	3.548	9.754	14.46	7.794	4.966	19	4.342				
PCB 1254:1260 (conversion to total PCB congener conc see pg. 39)	N		9	10	10	10	10	10	10	10	10	1	1	1
	MEAN		75.43	23.28	45.35	59.05	27.48	31.33	39.7	17.81	19.51	14.3	13.41	15.54
	STD		17.78	5.824	10.98	16.92	9.301	5.61	24.5	5.043	8.708			

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.[*]

LAKE SUPERIOR, GRAVEL ISLAND

DOUBLE-CRESTED CORMORANT		YEAR
		83
PERCENT LIPID IN EGG	N	1
	MEAN	4.7
	STD	
ALPHA-CHLORDANE	N	1
	MEAN	0.01
	STD	
GAMMA-CHLORDANE	N	1
	MEAN	0.005
	STD	
OXY-CHLORDANE	N	1
	MEAN	0.12
	STD	
1234-CHLOROBENZENE	N	1
	MEAN	.0005
	STD	
1235-/ 1245-CHLOROBENZENE	N	1
	MEAN	.0005
	STD	
PENTA-CHLOROBENZENE	N	1
	MEAN	0.005
	STD	
HEXA-CHLOROBENZENE	N	1
	MEAN	0.034
	STD	
DDD	N	1
	MEAN	0.01
	STD	

---

[*] All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.[*]

LAKE SUPERIOR, GRAVEL ISLAND

DOUBLE-CRESTED CORMORANT		YEAR
		83
DDE	N	1
	MEAN	2.46
	STD	
DDT	N	1
	MEAN	0.01
	STD	
DIELDRIN	N	1
	MEAN	0.4
	STD	
HEPTACHLOR EPOXIDE	N	1
	MEAN	0.09
	STD	
ALPHA-HEXACHLOROCYCLOHEXANE	N	1
	MEAN	0.02
	STD	
BETA-HEXACHLOROCYCLOHEXANE	N	1
	MEAN	0.01
	STD	
MIREX	N	1
	MEAN	0.03
	STD	
TRANS-NONACHLOR	N	1
	MEAN	0.01
	STD	
PCB 1260	N	1
	MEAN	10
	STD	

---

[*] All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.[*]

LAKE SUPERIOR, GRAVEL ISLAND

DOUBLE-CRESTED CORMORANT		YEAR
		83
PCB 1254:1260 (conversion to total PCB congener conc see pg. 39)	N	1
	MEAN	12.9
	STD	

[*] All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.'

LAKE SUPERIOR, SILVER ISLET

HERRING GULL		YEAR		
		73	75	77
PERCENT LIPID IN EGG	N	2	10	10
	MEAN	7.55	8.16	9.23
	STD	.0707	.9082	0.779
ALPHA-CHLORDANE	N			10
	MEAN			0.021
	STD			.0074
OXY-CHLORDANE	N			10
	MEAN			.2610
	STD			.1540
HEXA-CHLOROBENZENE	N	2	10	10
	MEAN	0.19	.1216	.1230
	STD	.0269	.0822	.1718
DDD	N	2	10	10
	MEAN	0.007	.1372	.1417
	STD		.0506	.0625
DDE	N	2	10	10
	MEAN	26.8	24.16	11.82
	STD	6.647	10.85	6.882
DDT	N	2	10	10
	MEAN	.5889	.2508	0.057
	STD	.0806	.1231	.0316
DIELDRIN	N	2	10	10
	MEAN	0.435	0.44	0.353
	STD	.1485	.3355	.1636
HEPTACHLOR EPOXIDE	N	2	10	10
	MEAN	0.08	0.19	0.109
	STD	.0283	.0806	.0475

'All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.[*]

LAKE SUPERIOR, SILVER ISLET

HERRING GULL		YEAR		
		73	75	77
BETA-HEXACHLORO-CYCLOHEXANE	N			10
	MEAN			0.026
	STD			.0246
TOTAL MERCURY	N	2	10	
	MEAN	0.53	0.417	
	STD	.0424	.1193	
MIREX	N		10	10
	MEAN		0.619	0.237
	STD		.3686	.2253
PHOTOMIREX	N			10
	MEAN			0.115
	STD			0.103
PCB 1260	N	2	10	10
	MEAN	52.35	63.52	44.35
	STD	16.62	26.27	18.81
PCB 1254:1260 (conversion to total PCB congener conc see pg. 39)	N		10	10
	MEAN		82.02	54.91
	STD		33.34	22.2

---

[*] All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.'

LAKE SUPERIOR, PAPOOSE ISLAND

HERRING GULL		YEAR 83
PERCENT LIPID IN EGG	N	1
	MEAN	7.8
	STD	
OXY-CHLORDANE	N	1
	MEAN	0.258
	STD	
HEXA-CHLOROBENZENE	N	1
	MEAN	0.052
	STD	
DDD	N	1
	MEAN	0.018
	STD	
DDE	N	1
	MEAN	3.46
	STD	
DIELDRIN	N	1
	MEAN	0.376
	STD	
HEPTACHLOR EPOXIDE	N	1
	MEAN	0.183
	STD	
MIREX	N	1
	MEAN	0.051
	STD	
PCB 1254:1260 (conversion to total PCB congener conc see pg. 39)	N	1
	MEAN	15.7
	STD	

'All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.[*]

LAKE SUPERIOR, GULL ISLAND

HERRING GULL		YEAR	
		83	86
PERCENT LIPID IN EGG	N	2	1
	MEAN	8.85	6.7
	STD	.6364	
ALPHA-CHLORDANE	N	1	
	MEAN	0.01	
	STD		
GAMMA-CHLORDANE	N	1	
	MEAN	0.005	
	STD		
OXY-CHLORDANE	N	2	
	MEAN	.4005	
	STD	.1124	
1234-CHLOROBENZENE	N	1	
	MEAN	0.024	
	STD		
1235-/ 1245-CHLOROBENZENE	N	1	
	MEAN	0.006	
	STD		
PENTA-CHLOROBENZENE	N	1	
	MEAN	0.014	
	STD		
HEXA-CHLOROBENZENE	N	2	
	MEAN	.0765	
	STD	.0064	
DDD	N	2	
	MEAN	.0225	
	STD	.0177	

---

[*] All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.[*]

LAKE SUPERIOR, GULL ISLAND

HERRING GULL		YEAR	
		83	86
DDE	N	2	
	MEAN	4.57	
	STD	.1131	
DDT	N	1	
	MEAN	0.02	
	STD		
DIELDRIN	N	2	
	MEAN	.5455	
	STD	.1054	
2378-TETRACHLORO-DIBENZO-P-DIOXIN	N		1
	MEAN		16
	STD		
12378-PENTACHLORO-DIBENZO-P-DIOXIN	N		1
	MEAN		11
	STD		
123678-HEXACHLORO-DIBENZO-P-DIOXIN	N		1
	MEAN		14
	STD		
1234678-HEPTACHLORO-DIBENZO-P-DIOXIN	N		1
	MEAN		6
	STD		
OCTACHLORO-DIBENZO-P-DIOXIN	N		1
	MEAN		10
	STD		
2378-TETRACHLORO-DIBENZOFURAN	N		1
	MEAN		2
	STD		

[*] All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.[*]

LAKE SUPERIOR, GULL ISLAND

HERRING GULL		YEAR	
		83	86
23478-PENTACHLORO-DIBENZOFURAN	N		1
	MEAN		8
	STD		
123478-/ 123467-HEXACHLORO-DIBENZOFURAN	N		1
	MEAN		4
	STD		
123678-HEXACHLORO-DIBENZOFURAN	N		1
	MEAN		4
	STD		
HEPTACHLOR EPOXIDE	N	2	
	MEAN	0.261	
	STD	.0127	
ALPHA-HEXACHLORO-CYCLOHEXANE	N	1	
	MEAN	0.01	
	STD		
BETA-HEXACHLORO-CYCLOHEXANE	N	1	
	MEAN	0.01	
	STD		
MIREX	N	2	
	MEAN	0.108	
	STD	.0028	
TRANS-NONACHLOR	N	1	
	MEAN	0.02	
	STD		
PCB 1260	N	1	
	MEAN	29.4	
	STD		

[*] All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.[1]

LAKE SUPERIOR, GULL ISLAND

HERRING GULL		YEAR	
		83	86
PCB 1254:1260 (conversion to total PCB congener conc see pg. 39)	N	2	
	MEAN	32.65	
	STD	6.01	

---

[1] All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.'

LAKE SUPERIOR, KNIFE ISLAND

HERRING GULL		YEAR 83
PERCENT LIPID IN EGG	N	1
	MEAN	8.3
	STD	
OXY-CHLORDANE	N	1
	MEAN	0.288
	STD	
HEXA-CHLOROBENZENE	N	1
	MEAN	0.052
	STD	
DDD	N	1
	MEAN	0.018
	STD	
DDE	N	1
	MEAN	3.84
	STD	
DIELDRIN	N	1
	MEAN	0.224
	STD	
HEPTACHLOR EPOXIDE	N	1
	MEAN	0.173
	STD	
MIREX	N	1
	MEAN	0.032
	STD	
PCB 1254:1260 (conversion to total PCB congener conc see pg. 39)	N	1
	MEAN	16.7
	STD	

'All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

Section 2.

Index to Trends in Contaminants In Herring Gull eggs from Great Lakes Annual Monitor Colonies

Figures 11-24. Trends in Contaminants in Herring Gull eggs from Great Lakes Annual Monitor Colonies

Index to trends in Contaminants in Herring Gull eggs from Great Lakes annual monitor colonies.

Page

EASTERN LAKE ONTARIO-Snake Island/West Brothers Island* ... 2-3

EASTERN LAKE ONTARIO-Scotch Bonnet Island.................. 2-4

WESTERN LAKE ONTARIO-Mugg's Island/Leslie St. Spit* 2-5

NIAGARA RIVER 2-6

EASTERN LAKE ERIE-Port Colborne Lighthouse.................. 2-7

WESTERN LAKE ERIE-Middle Island............................. 2-8

DETROIT RIVER-Fighting Island............................... 2-9

LAKE HURON-Chantry Island................................... 2-10

LAKE HURON-Channel Shelter Island........................... 2-11

LAKE HURON-Double Island.................................... 2-12

LAKE MICHIGAN-Gull Island/Trout Island*..................... 2-13

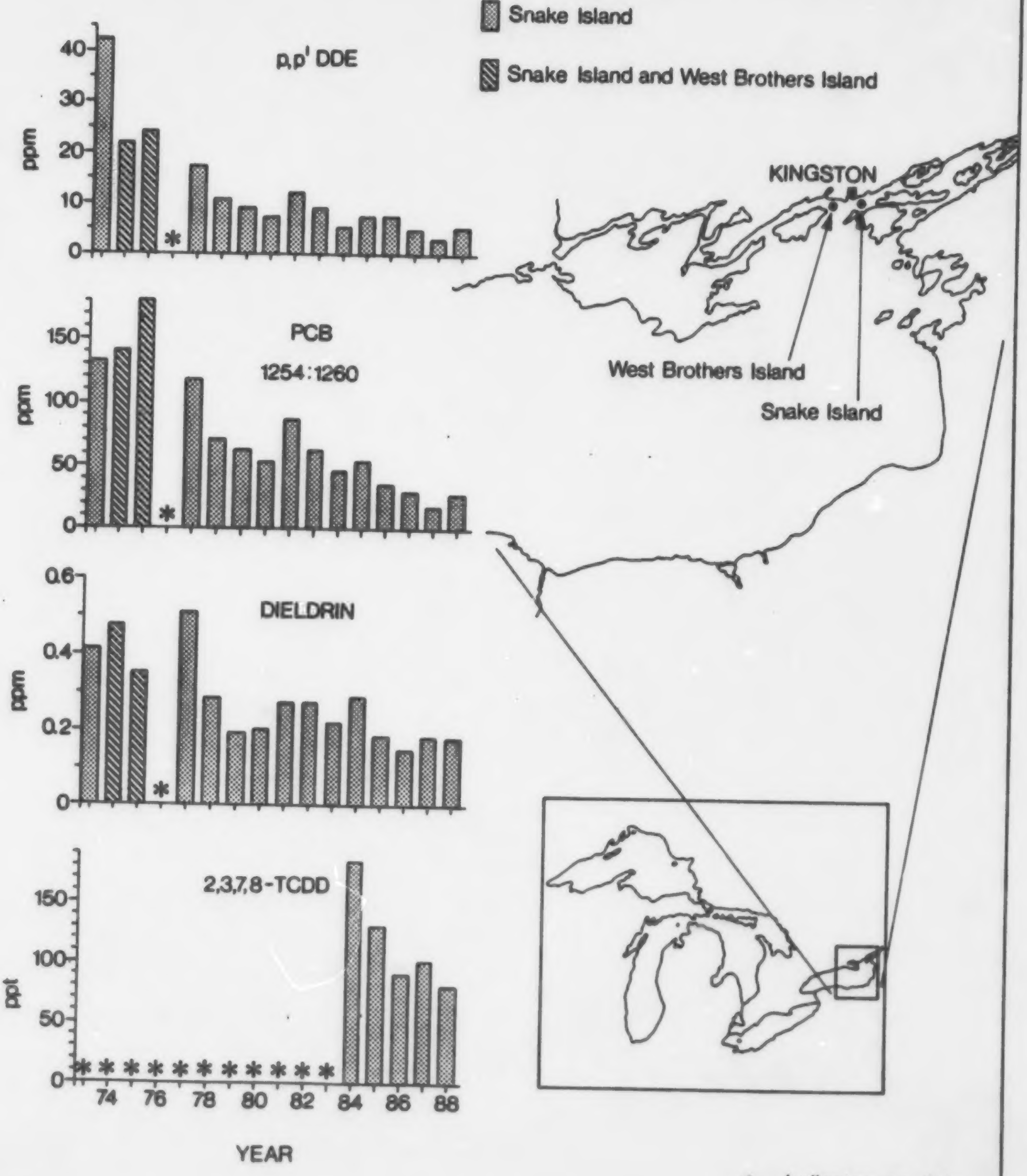
LAKE MICHIGAN... 2-14
-Big Sister Island/Hat Island/
Little Sister Island*

LAKE SUPERIOR-Agawa Rock/Mammainse*......................... 2-15

LAKE SUPERIOR-Granite Island/Silver Islet*.................. 2-16

*The combined results during 1970-1988 from these colonies represent the trends in contaminant concentrations in Herring Gull eggs from that general site on each particular Lake.

Figure 11. Trends in mean concentrations of p,p'-DDE, dieldrin, PCB 1254:1260 and 2,3,7,8-TCDD in Herring Gull eggs from Snake Island and West Brothers Island, Lake Ontario (1973-1988).



* - Indicates no data

Figure 12. Trends in mean concentrations of p,p'-DDE, dieldrin, PCB 1254:1260 and 2,3,7,8-TCDD in Herring Gull eggs from Scotch Bonnet Island, Lake Ontario (1971-1982)

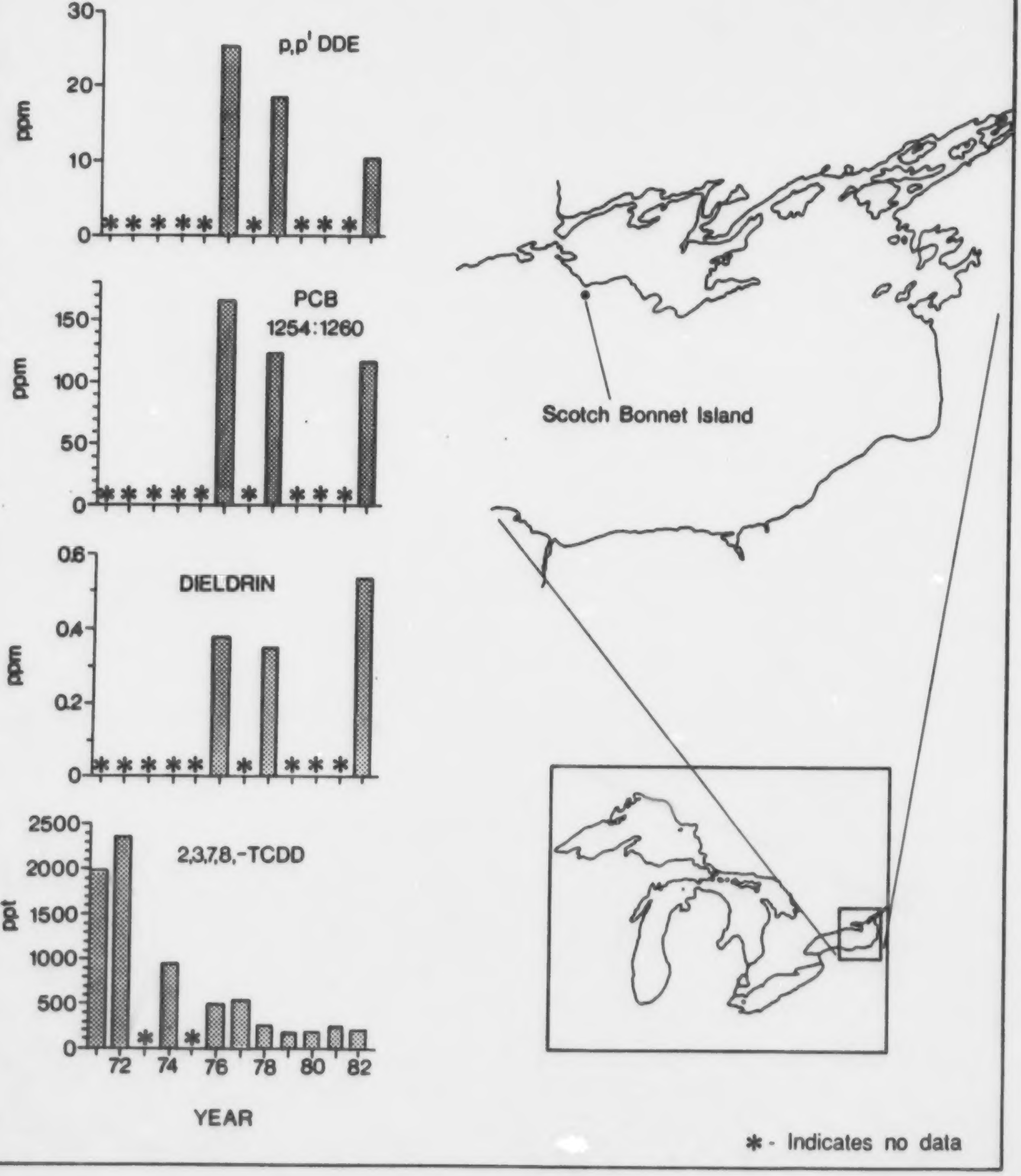


Figure 13. Trends in mean concentrations of p,p'-DDE, dieldrin, PCB 1254:1260 and 2,3,7,8-TCDD in Herring Gull eggs from Mugg's Island and Leslie St. Spit, Lake Ontario (1974-1988).

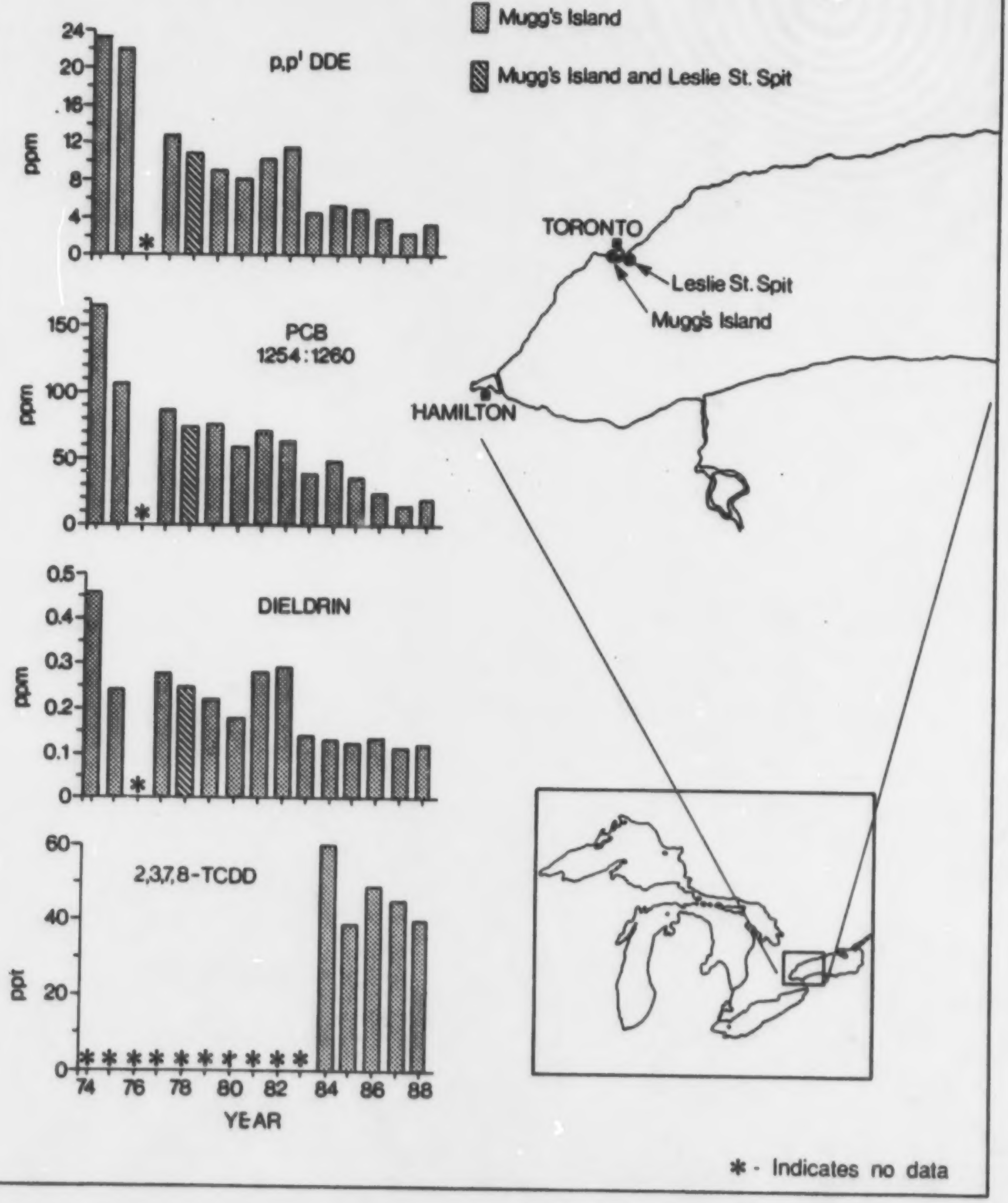


Figure 14. Trends in mean concentrations of p,p'-DDE, dieldrin, PCB 1254:1260 and 2,3,7,8-TCDD in Herring Gull eggs from the Niagara River (1979-1988).

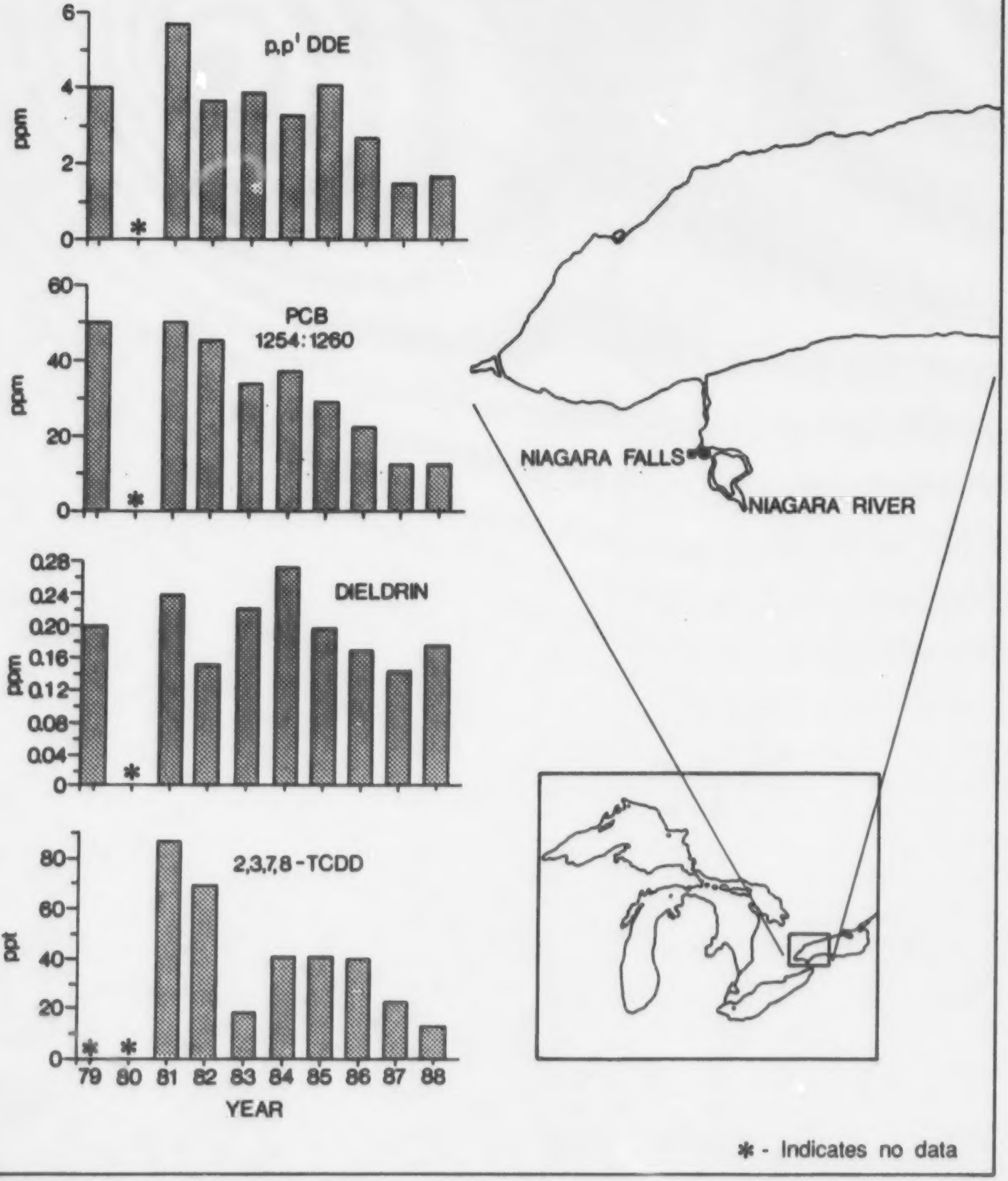
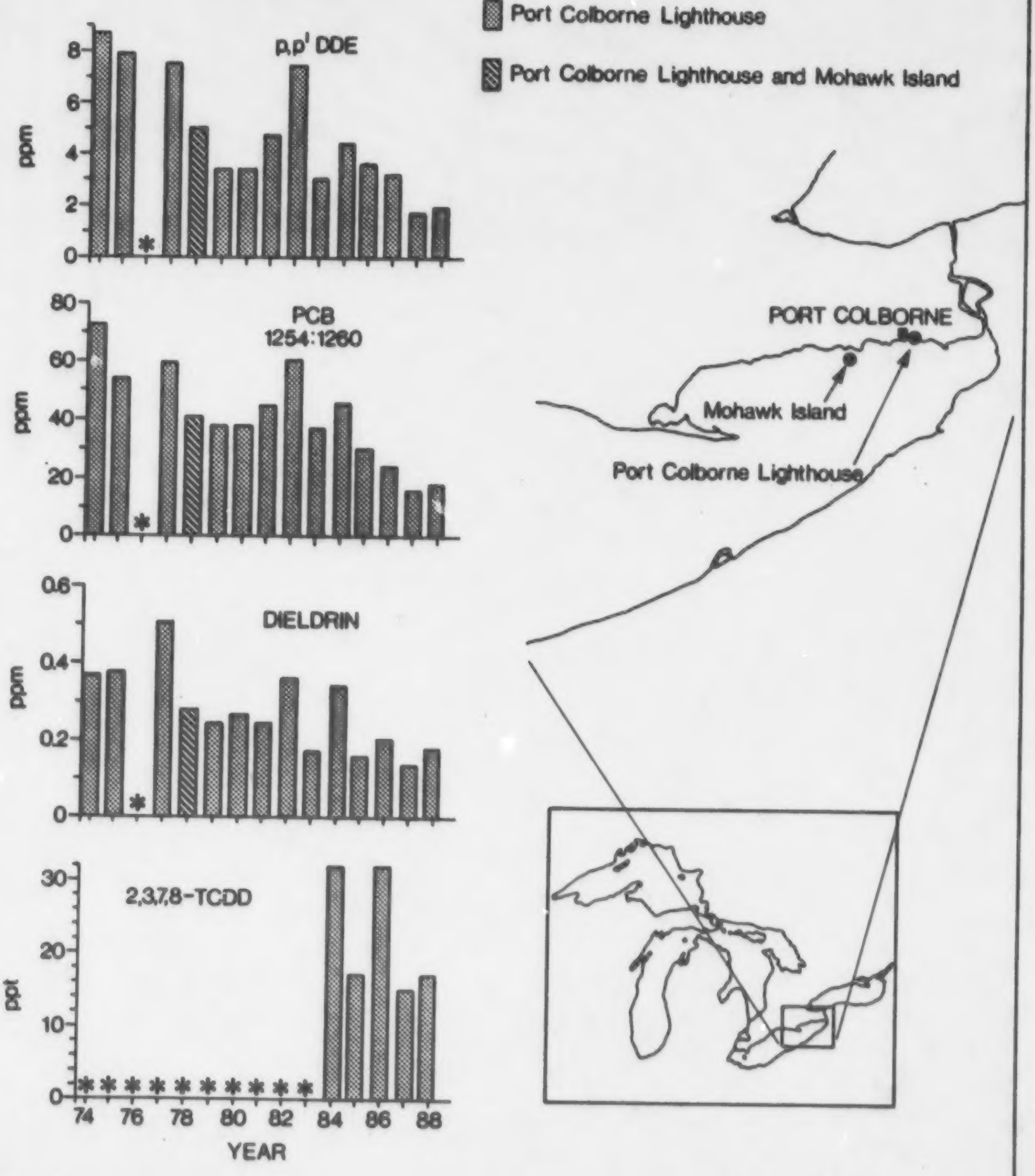


Figure 15. Trends in mean concentrations of p,p'-DDE, dieldrin, PCB 1254:1260 and 2,3,7,8-TCDD in Herring Gull eggs from Port Colborne Lighthouse and Mohawk Island, Lake Erie (1974-1988).



* - Indicates no data

Figure 16. Trends in mean concentrations of p,p'-DDE, dieldrin, PCB 1254:1260 and 2,3,7,8-TCDD in Herring Gull eggs from Middle Island, Lake Erie (1974-1988).

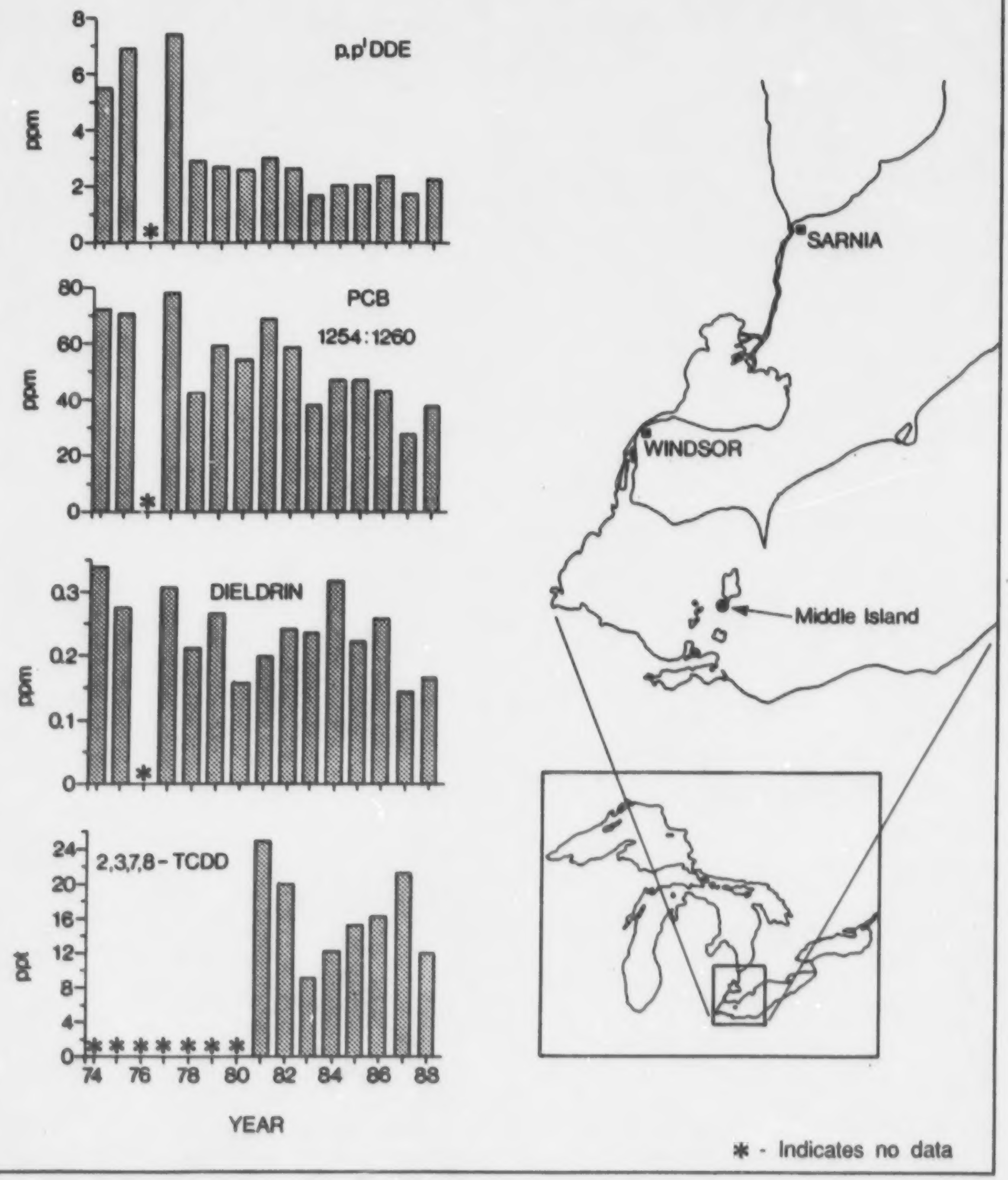


Figure 17. Trends in mean concentrations of p,p'-DDE, dieldrin, PCB 1254:1260 and 2,3,7,8-TCDD in Herring Gull eggs from Fighting Island, Detroit River (1972-1988).

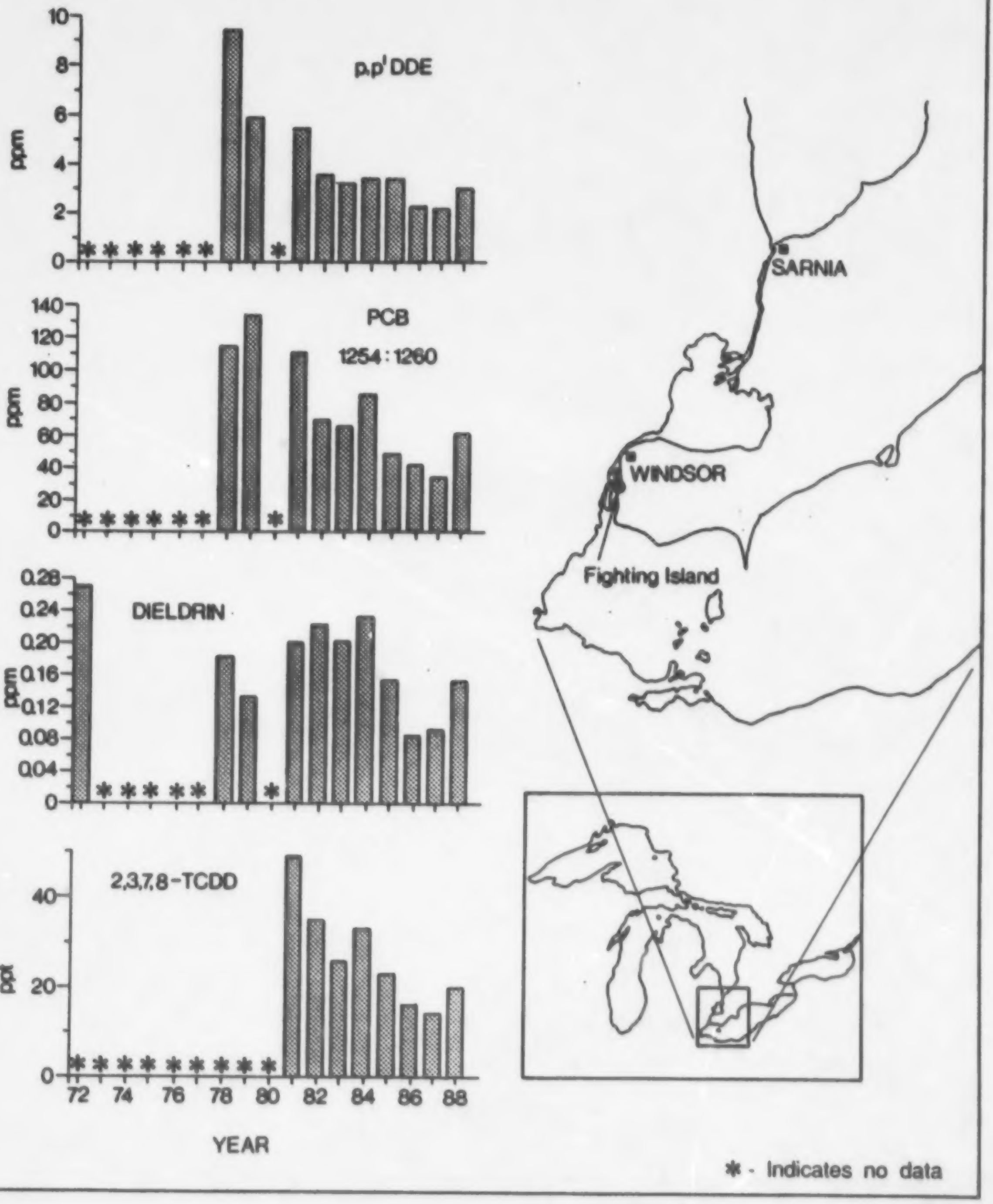


Figure 18. Trends in mean concentrations of p,p'-DDE, dieldrin, PCB 1254:1260 and 2,3,7,8-TCDD in Herring Gull eggs from Chantry Island, Lake Huron (1974-1988).

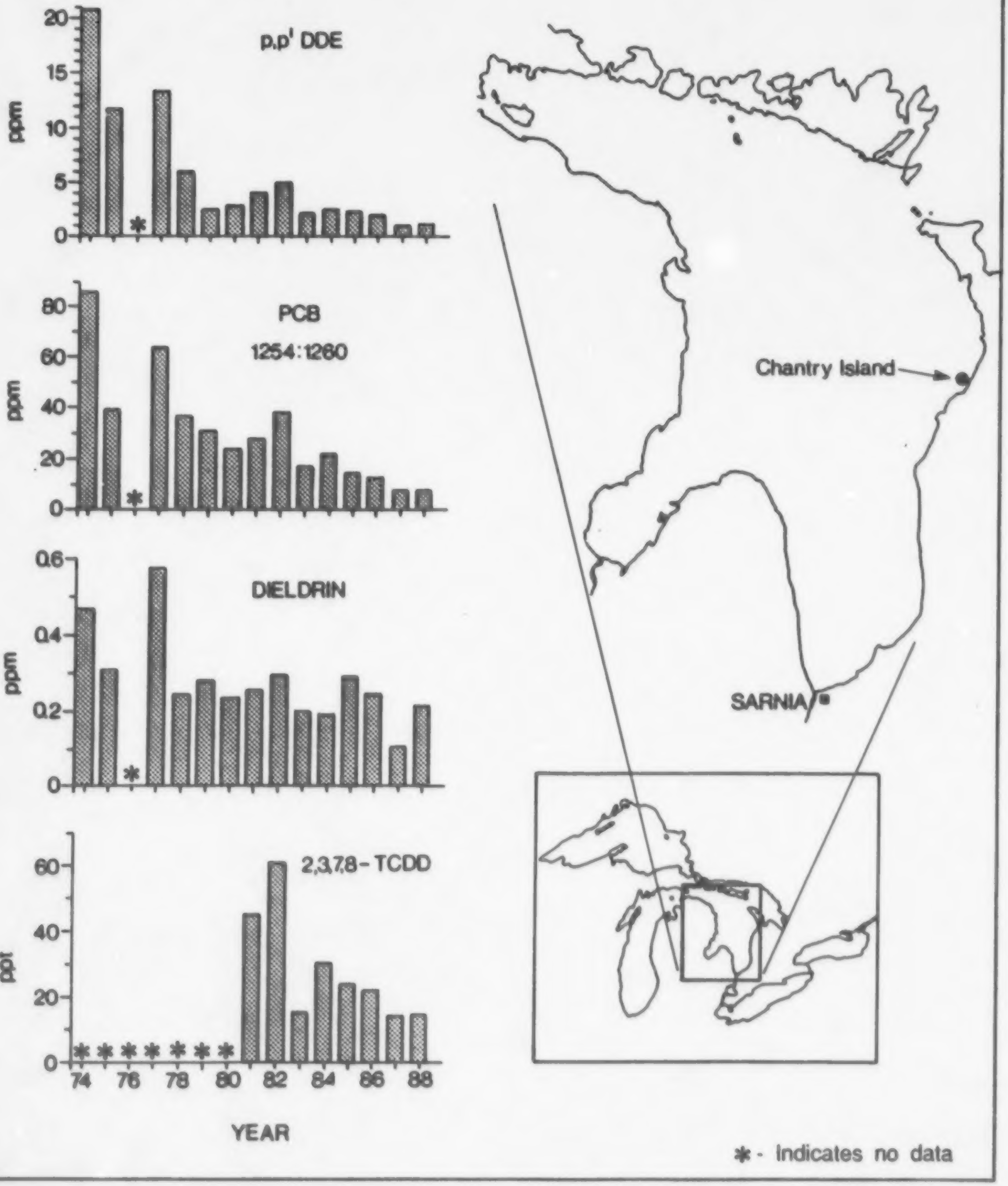
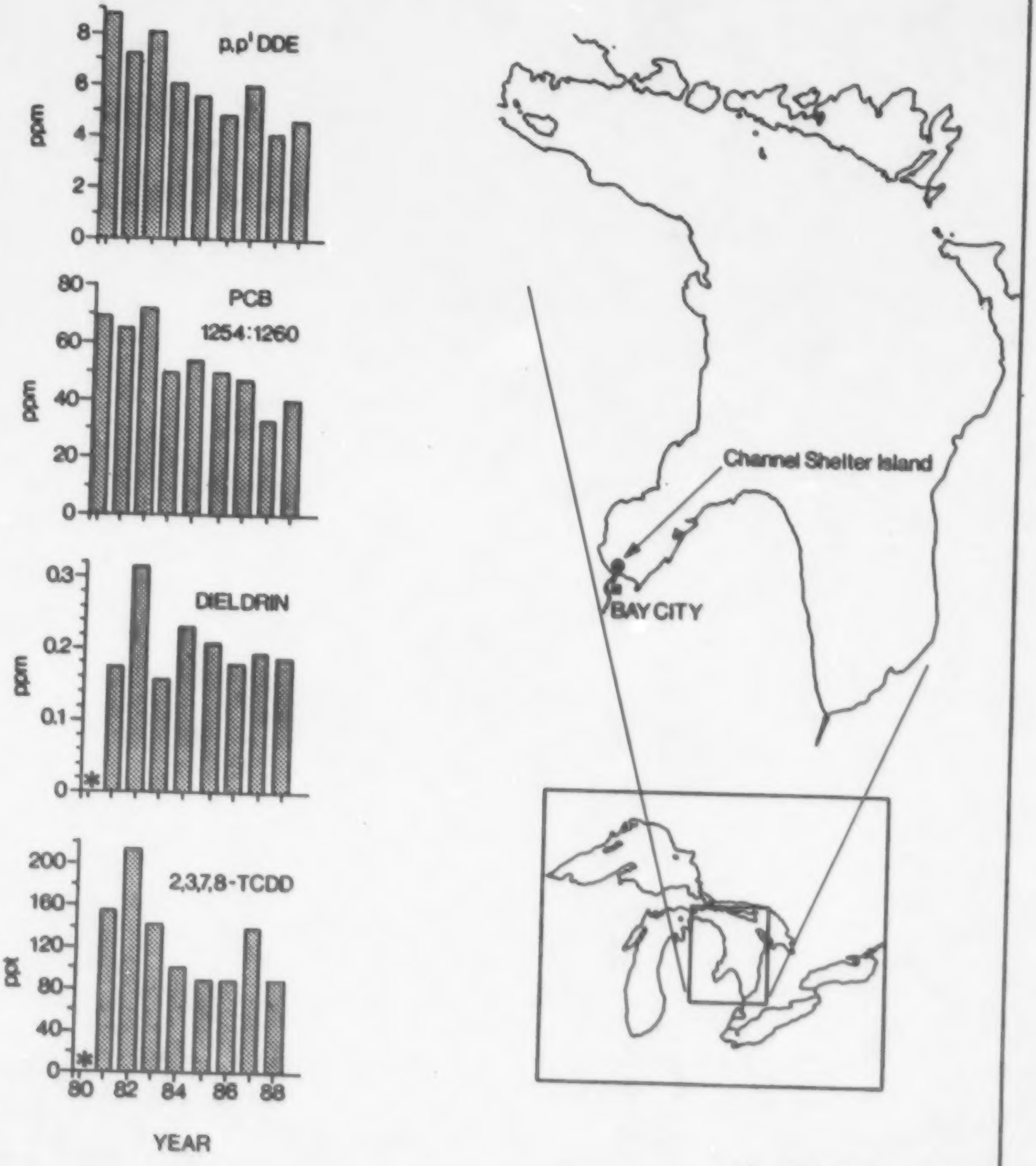


Figure 19. Trends in mean concentrations of p,p'-DDE, dieldrin, PCB 1254:1260 and 2,3,7,8-TCDD in Herring Gull eggs from Channel Shelter Island, Lake Huron (1980-1988).



* - Indicates no data

Figure 20. Trends in mean concentrations of p,p'-DDE, dieldrin, PCB 1254:1260 and 2,3,7,8-TCDD in Herring Gull eggs from Double Island, North Channel, Lake Huron (1974-1988).

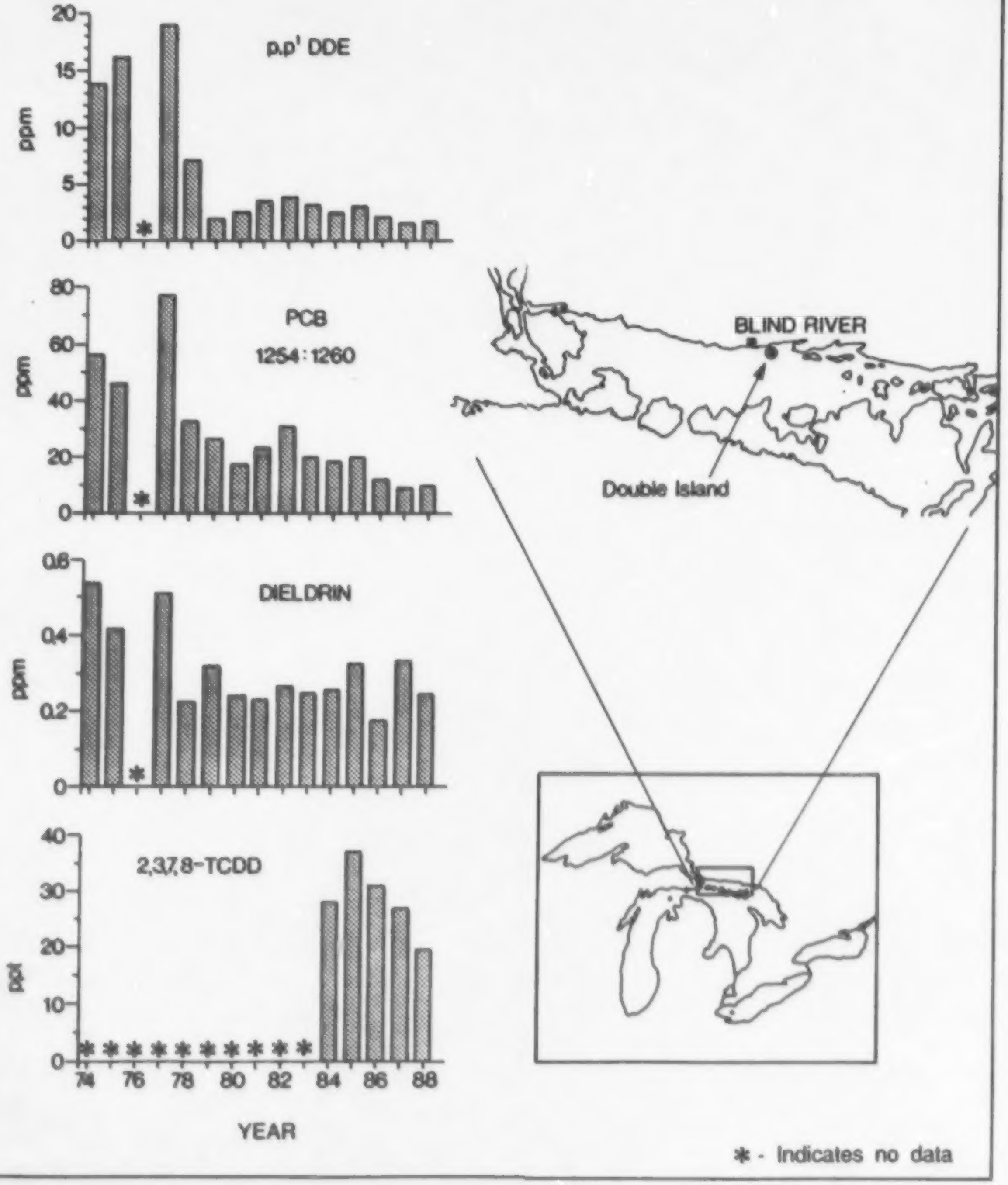
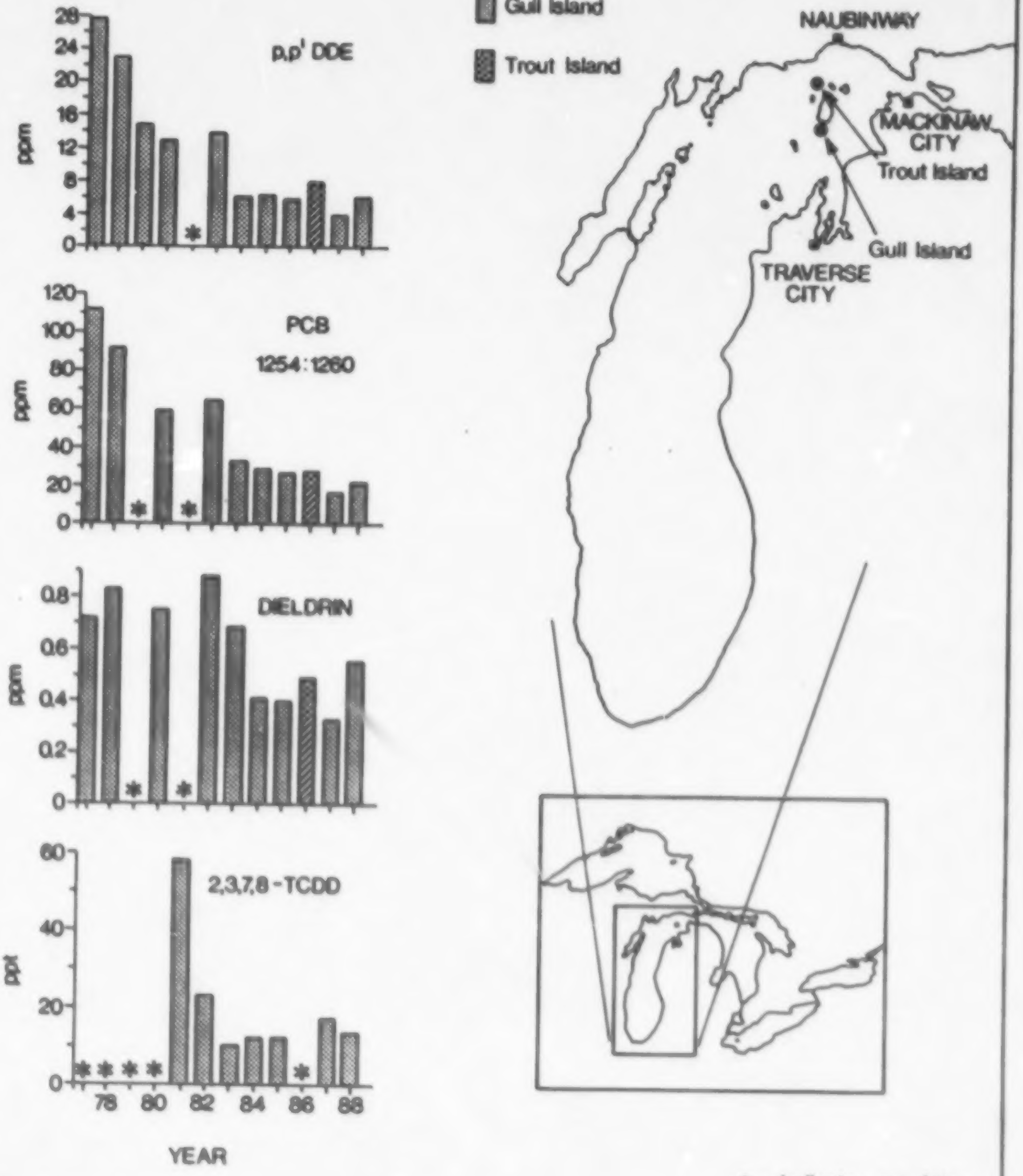
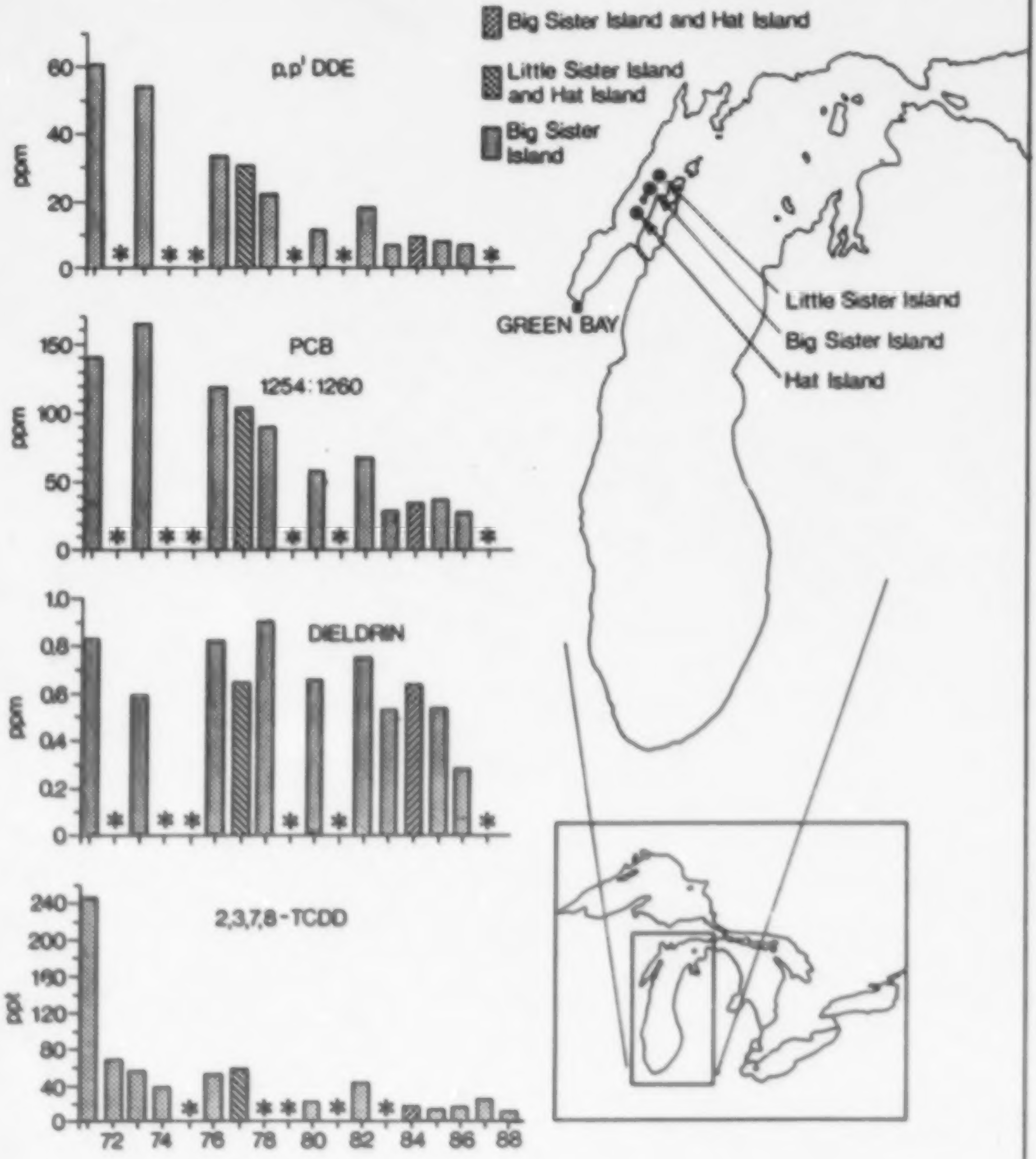


Figure 21. Trends in mean concentrations of p,p'-DDE, dieldrin, PCB 1254:1260 and 2,3,7,8-TCDD in Herring Gull eggs from Gull Island and Trout Island, Lake Michigan (1977-1988).



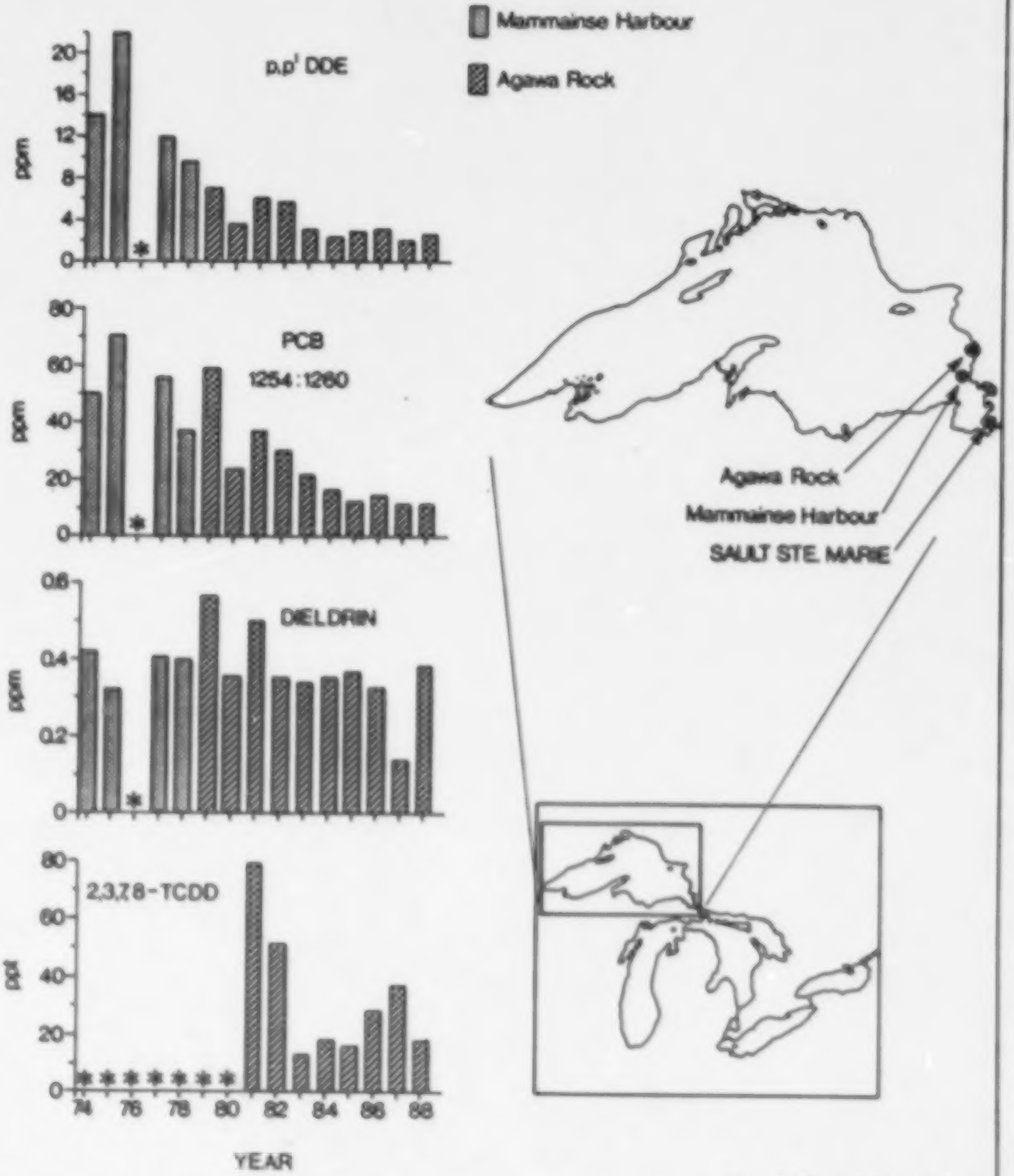
* - Indicates no data

Figure 22. Trends in mean concentrations of p,p'-DDE, dieldrin, PCB 1254:1260 and 2,3,7,8-TCDD in Herring Gull eggs from Big Sister Island, Hat Island and Little Sister Island, Lake Michigan (1971-1988).



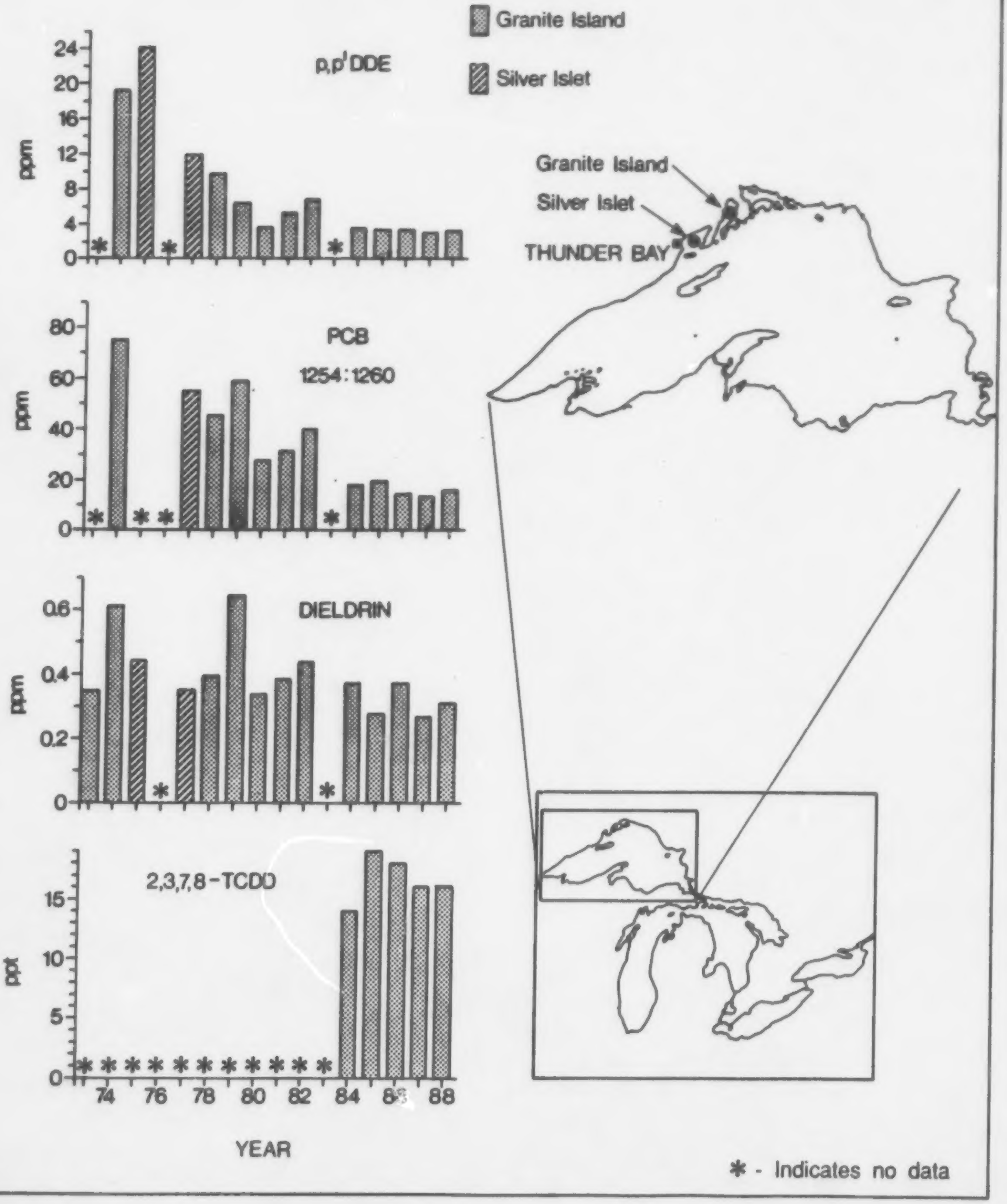
* - Indicates no data

Figure 23. Trends in mean concentrations of p,p'-DDE, dieldrin, PCB 1254:1260 and 2,3,7,8-TCDD in Herring Gull eggs from Agawa Rock and Mammainse Harbour, Lake Superior (1974-1988).



* - Indicates no data

Figure 24. **Trends in mean concentrations of p,p'-DDE, dieldrin, PCB 1254:1260 and 2,3,7,8-TCDD in Herring Gull eggs from Granite Island and Silver Islet, Lake Superior (1973-1988).**



✱ - Indicates no data

Section 4.

Species Accounts:

Herring Gull
Double-crested Cormorant
Caspian Tern
Common Tern
Black-crowned Night-Heron
Ring-billed Gull
Forster's Tern

The following accounts introduce population trends for each species, and temporal and geographic variation of contaminant concentrations in eggs of each species. The contaminant trends discussed pertain mainly to "major" contaminants (DDT, p,p'-DDE (DDE), hexachlorobenzene (HCB), mirex, dieldrin, heptachlor epoxide and polychlorinated biphenyl (PCB) 1254:1260) although other compounds are included. **Not all of these contaminants are discussed in every species account due to the varying sources of information which were used to compile these summaries. The reader should refer to the references cited for more detailed information concerning each species.**

Index to Species Accounts

Page

Herring Gull.. 3-2

Double-crested Cormorant............................ 3-12

Caspian Tern.. 3-16

Common Tern... 3-18

Black-crowned Night-Heron........................... 3-21

Ring-billed Gull.................................... 3-24

Forster's Tern...................................... 3-26

HERRING GULL (*Larus argentatus*)

Distribution, Abundance, and Population Trends

The Herring Gull nests in all five Great Lakes and connecting channels. This species is the second most abundant fish-eating colonial waterbird nesting on the Great Lakes (Blokpoel and Scharf, 1991) and it is also the most abundant colonial waterbird nesting on Lake Superior (Blokpoel, unpublished) and in western Lake Erie (Weseloh et al., 1988a).

Breeding population censuses for the Canadian and U.S. Great Lakes in 1976-1980 reported 75015 nests (Weseloh et al.,1986). During a 19 year period, 1960-62 to 1980, in the Canadian colonies of Lake Huron, populations increased at an average annual rate of 1.6% (Weseloh et al., 1986); on Canadian western Lake Erie, during the five year period of 1979-1984, the population increased 78.2% (Weseloh et al.,1988a). In Lake Ontario between 1976 and 1987, numbers had increased from 519 to 1540 nests (33.7%) (Blokpoel and Scharf, 1991). In the U.S. Great Lakes colonies, populations increased 8.2% between 1976 and 1977 (Scharf et al., 1978).

In 1989, a census of colonial waterbirds in the Canadian portions of Lakes Huron and Superior recorded 24628 and 11496 Herring Gull nests, respectively (Blokpoel and Tessier, 1991). The Herring Gull was the most numerous among five colonial waterbird species inventoried. Between 1980 and 1989, Herring Gull numbers in Canadian Lake Huron have increased from 24268 to 33547 nests and in Lake Superior have increased from 6136 nests to 11496 nests (Blokpoel and Tessier, 1991).

Table 12. Years and sites of collection of Herring Gull eggs.

Sample year	Collection Site
1971	Scotch Bonnet Isl. (L. Ont.)
	Big Sister Isl. (L. Michigan)
1972	Scotch Bonnet Isl. (L. Ont.)
	Pigeon Isl. (L.Ont.)
	Fighting Isl. (Detroit R.)
	Big Sister Isl. (L. Michigan)
1973	West Brothers Isl. (L.Ont.)
	Big Sister Isl. (L. Michigan)
	Granite Isl. (L. Superior)
	Silver Islet (L. Superior)
1974	West Brothers Isl. (L.Ont.)
	Scotch Bonnet Isl. (L.Ont.)
	Mugg's Isl. (L.Ont.)
	Port Colborne Lighthouse (L. Erie)
	Middle Isl. (L.Erie)
	Chantry Isl. (L.Huron)
	Double Isl. (N.Chan/L.Huron)
	Big Sister Isl. (L. Michigan)
	Mammainse Harbour (L.Superior)
	Granite Isl. (L. Superior)
1975	West Brothers Isl. (L.Ont.)
	Mugg's Isl. (L.Ont.)
	Port Colborne Lighthouse (L.Erie)
	Middle Isl. (L.Erie)
	Chantry Isl. (L.Huron)
	Double Isl. (N.Chan/L.Huron)
	Mammainse Harbour (L.Superior)
	Silver Islet (L. Superior)
1976	Scotch Bonnet Isl. (L.Ont.)
	Gull Isl. (L.Ont.)
	South Limestone I.(Georg.Bay)
	Big Sister Isl. (L. Michigan)
	Granite Isl. (L. Superior)
1977	Snake Isl. (L.Ont.)
	Scotch Bonnet Isl. (L.Ont.)
	Gull Isl. (L.Ont.)
	Mugg's Isl. (L.Ont.)

Table 12 (continued)

Sample year	Collection Site
1977 (continued)	Port Colborne Lighthouse (L.Erie)
	Middle Isl. (L.Erie)
	Chantry Isl. (L.Huron)
	Double Isl. (N.Chan/L.Huron)
	Hat Island-Green Bay (L.Michigan)
	Little Sister Isl.(L.Michigan)
	Big Sister Isl. (L. Michigan)
	Mammainse Harbour (L.Superior)
	Silver Islet (L. Superior)
1978	Snake Isl. (L.Ont.)
	Leslie St. Spit (L.Ont.)
	Mugg's Isl. (L.Ont.)
	Scotch Bonnet Isl. (L. Ont)
	Gull Isl. (L. Ont.)
	Port Colborne Lighthouse (L.Erie)
	Mohawk Isl. (L.Erie)
	Middle Isl. (L.Erie)
	Middle Sister Isl. (L.Erie)
	Fighting Isl. (Detroit R.)
	Chantry Isl. (L.Huron)
	Double Isl. (North Chan./L.Huron)
	Gull Isl. (L.Michigan)
	Bellows Isl. (L.Michigan)
	Big Sister Isl. (L. Michigan)
	Mammainse Harbour (L.Superior)
	Agawa Rock (L.Superior)
	Granite Isl. (L. Superior)
1979	Snake Isl. (L.Ont.)
	Scotch Bonnet Isl. (L.Ont.)
	Mugg's Isl. (L.Ont.)
	Niagara River
	Port Colborne Lighthouse (L.Erie)
	Sandusky Harbour (L. Erie)
	Middle Isl. (L.Erie)
	Fighting Isl. (Detroit R.)
	Chantry Isl. (L.Huron)
	Double Isl. (North Chan./L.Huron)
	Gull Isl. (L.Michigan)
	Big Sister Isl. (L. Michigan)
	Agawa Rock (L.Superior)

Table 12 (continued)

Sample year	Collection Site
1980	Snake Isl. (L.Ont.)
	Scotch Bonnet Isl. (L.Ont.)
	Gull Isl. (L.Ont.)
	Mugg's Isl. (L.Ont.)
	Port Colborne Lighthouse (L.Erie)
	Middle Isl. (L.Erie)
	Chantry Isl. (L.Huron)
	Manitoba Reef (L.Huron)
	Black River (L.Huron)
	Little Charity Isl. (L.Hron)
	Channel Shelter Isl. (L.Huron)
	Nottawasaga Island (Georg.Bay)
	Castle Rock (Georg.Bay)
	Double Isl. (North Chan./L.Huron)
	Pumpkin Point (North Chan./L.Huron)
	Gull Isl. (L.Michigan)
	Big Sister Isl. (L. Michigan)
	Agawa Rock (L.Superior)
	Granite Isl. (L. Superior)
1981	Snake Isl. (L.Ont.)
	Pigeon Isl. (L.Ont.)
	Little Galloo Isl. (L.Ont.)
	Scotch Bonnet Isl. (L.Ont.)
	Mugg's Isl. (L.Ont.)
	Hamilton Harbour (L.Ont.)
	Niagara River
	Port Colborne Lighthouse (L.Erie)
	Middle Isl. (L.Erie)
	Fighting Isl. (Detroit R.)
	Chantry Isl. (L.Huron)
	Channel Shelter Isl. (L.Huron)
	Double Isl. (North Chan./L.Huron)
	Gull Isl. (L.Michigan)
	Agawa Rock (L.Superior)
	Granite Isl. (L. Superior)

Table 12 (continued)

Sample year	Collection Site
1982	Snake Isl. (L.Ont.)
	Pigeon Isl. (L.Ont.)
	Little Galloo Isl. (L.Ont.)
	Scotch Bonnet Isl. (L.Ont.)
	Gull Isl. (L.Ont.)
	Hamilton Harbour (L.Ont.)
	Muggs Isl. (L. Ont.)
	Port Colborne Lighthouse (L. Erie)
	Niagara River
	Middle Isl. (L.Erie)
	Fighting Isl. (Detroit R.)
	Chantry Isl. (L.Huron)
	Channel Shelter Isl. (L.Huron)
	Double Isl. (North Chan./L.Huron)
	Gull Isl. (L.Michigan)
	Big Sister Isl. (L. Michigan)
	Agawa Rock (L.Superior)
	Granite Isl. (L. Superior)
1983	Snake Isl. (L.Ont.)
	Mugg's Isl. (L.Ont.)
	Niagara River
	Port Colborne Lighthouse (L. Erie)
	Middle Isl. (L.Erie)
	Fighting Isl. (Detroit R.)
	Chantry Isl. (L.Huron)
	Channel Shelter Isl. (L.Huron)
	Double Isl. (North Chan./L.Huron)
	Gull Isl. (L.Michigan)
	Big Sister Isl. (L. Michigan)
	Chene Isl. (L.Superior)
	Gull Isl. (L. Superior)
	Agawa Rock (L. Superior)
	Papoose Isl. (L. Superior)
	Leadman Isl. (L. Superior)
	Huron Isl. (L. Superior)
	Lake Linden (L. Superior)
	Knife Isl. (L. Superior)

Table 12 (continued)

Sample year	Collection Site
1984	Snake Isl. (L.Ont.)
	Mugg's Isl. (L.Ont.)
	Hamilton Harbour (L.Ont.)
	Niagara River
	Port Colborne Lighthouse (L.Erie)
	Middle Isl. (L.Erie)
	Fighting Isl. (Detroit R.)
	Chantry Isl. (L.Huron)
	Channel Shelter Isl. (L.Huron)
	Double Isl. (North Chan./L.Huron)
	Gull Isl. (L.Michigan)
	Fish Isl. (L.Michigan)
	Gravel Isl. (L.Michigan)
	Spider Isl. (L.Michigan)
	Big Sister Isl. (L. Michigan)
	Agawa Rock (L.Superior)
	Granite Isl. (L. Superior)
1985	Snake Isl. (L.Ont.)
	Mugg's Isl. (L.Ont.)
	Niagara River
	Port Colborne Lighthouse (L.Erie)
	Middle Isl. (L.Erie)
	Fighting Isl. (Detroit R.)
	Chantry Isl. (L.Huron)
	Channel Shelter Isl. (L.Huron)
	Double Isl. (N.Chan/L.Huron)
	Pumpkin Point (North Chan./L.Huron)
	Gull Isl. (L.Michigan)
	Big Sister Isl. (L. Michigan)
	Agawa Rock (L.Superior)
1986	Strachan Isl. (St.Lawrence R.)
	Snake Isl. (L.Ont.)
	Mugg's Isl. (L.Ont.)
	Hamilton Harbour (L.Ont.)
	Niagara River
	Port Colborne Lighthouse (L.Erie)
	Middle Isl. (L.Erie)
	Fighting Isl. (Detroit R.)
	Chantry Isl. (L.Huron)
	Channel Shelter Isl. (L.Huron)
	Double Isl. (North Chan./L.Huron)
	Trout Isl. (L.Michigan)

Table 12 (continued)

Sample year	Collection Site
	Big Sister Isl. (L. Michigan)
	Agawa Rock (L.Superior)
	Granite Isl. (L. Superior)
	Gull Isl. (L. Superior)
1987	Snake Isl. (L.Ont.)
	Mugg's Isl. (L.Ont.)
	Hamilton Harbour (L. Ont.)
	Port Colborne Lighthouse (L. Ont.)
	Niagara River
	Middle Isl. (L.Erie)
	Fighting Isl. (Detroit R.)
	St.Clair River
	Chantry Isl. (L.Huron)
	Channel Shelter Isl. (L.Huron)
	Double Isl.(N.Channel/L.Huron)
	Gull Isl. (L.Michigan)
	Big Sister Isl. (L. Michigan)
	Agawa Rock (L.Superior)
	Granite Isl. (L.Superior)
1988	Strachan Isl. (St.Lawrence R.)
	Snake Isl. (L.Ont.)
	Leslie St. Spit (L.Ont.)
	Niagara River
	Port Colborne Lighthouse (L. Erie)
	Middle Isl. (L.Erie)
	Fighting Isl. (Detroit R.)
	Chantry Isl. (L.Huron)
	Channel Shelter Isl. (L.Huron)
	Double Isl. (North Chan./L.Huron)
	Gull Isl. (L.Michigan)
	Big Sister Isl. (L. Michigan)
	Agawa Rock (L.Superior)
	Granite Isl. (L. Superior)

Contaminant trends examined

In a review of temporal and spatial trends of contaminants occurring in Herring Gull eggs, Weseloh (unpublished) evaluated sixteen toxic chemicals for the period 1974-1985. (see also

Weseloh et al., 1979; Mineau et al.,1984; IJC,1987). The following is a summary of results and discussion of contaminant trends from that report and a brief description of trends in 1986-1988.

Of the sixteen contaminants examined, six are referred to as "major contaminants": p,p'-DDE, dieldrin, heptachlor epoxide (HE), hexachlorobenzene (HCB), mirex and PCB 1254:1260. These contaminants were designated as such due to the very high levels occurring in Herring Gull eggs at the beginning of the study. "Minor" contaminants included all the tri- and tetra-chlorobenzenes measured, pentachlorobenzene, oxy-chlordane, photo-mirex, and alpha- and beta-hexachlorocyclohexane. These were added to the analysis protocol in 1977 or later and in some cases, were eventually dropped from the protocol.

Colonies for which data have been analyzed are known as Great Lakes annual monitor colonies. These colonies are: Snake Isl. (L.Ont.), Mugg's Isl.(L.Ont.), Port Colborne Lighthouse (L.Erie), Middle Isl. (L.Erie), Chantry Isl.(L.Huron), Channel Shelter Isl.(L.Huron), Double Isl.(N.Channel/L.Huron), Gull Isl.(L.Michigan), Agawa Rock (L.Superior), and Granite Island (L.Superior).

Temporal variation in contaminant concentrations

During the twelve year period, 1974-1985, the maximum concentrations of all major contaminants at each site occurred in 1974 and/or 1975. The minimum concentration of most major contaminants occurred during 1983-1985. The minor compounds did not show the same uniformity among years for maximum and minimum concentrations.

By 1985, levels of three of the six major contaminants (DDE, mirex, and HCB) were reduced by at least 75% of what they were in 1974 at more than half of the sites. Again, minor contaminants did not show such widespread and extreme reduction since their first assessment although most have declined. In 1985, nearly all colony-compound comparisons were at some level less than 100% of what they were when first analyzed. For some, the reduction was quite marked (i.e. 44-94% for DDE, mirex and HCB). Only three compounds showed any increase between the time when they were first analyzed and 1985: oxy-chlordane, 1,2,3,4-tetrachlorobenzene and alpha-hexachlorocyclohexane. This comparison does not necessarily reflect what has happened during the intervening years of analysis, but only the change between the end points (1974/1985).

Regression analyses were carried out on 108 colony-contaminant data sets (13 compounds with 4 or more years of data x 9 colonies). In years for which sufficient data are available, all 13 compounds (DDE, dieldrin, heptachlor epoxide, photo-mirex,

.mirex, HCB, PCB 1254:1260, o-chlordane, 1234-tetrachlorobenzene, pentachlorobenzene, 1235/1245-tetrachlorobenzene, a-hexachlorocyclohexane, b-hexachloro-cyclohexane) showed a significant decrease on one or more colony sites. Only o-chlordane and a-HCH showed any increase and these occurred at one colony site each. Seventy (65%) of the 108 colony comparisons show a significant decline, 36 (33%) showed no change and 2 (2%) showed an increase.

During 1986-1988 some major contaminants (DDE, PCB 1254:1260, mirex, HCB, and dieldrin) increased in 1987 and decreased in 1988. The sites where these changes occurred were scattered throughout the lakes. DDE levels at Snake and Mugg's Island (Lake Ontario), Port Colborne Lighthouse (Lake Erie), and Gull Island (Lake Michigan) experienced these changes. These changes were also noted in PCB 1254:1260 at Snake and Mugg's Islands; Port Colborne Lighthouse, and Channel and Double Islands (Lake Huron); mirex at Snake Island, and Channel Island; photo-mirex at Port Colborne Lighthouse, and Middle Island, Channel Island and Double Island; hexachlorobenzene at Mugg's Island and Double Island; dieldrin at Double Island and Gull Island; and heptachlor epoxide at Agawa Rock (Lake Superior).

All the minor contaminants measured, except photo-mirex, and all other major contaminants did not show any substantial change during 1986-1988.

Geographic variation in contaminant concentrations

A Kruskal-Wallis one way ANOVA was used to determine significant rankings of contaminant levels among colonies over 3-4 year periods. For the major contaminants, the periods were 1974-78 (4 years of data), 1979-81 (3 years) and 1982-85 (4 years). For the minor contaminants the latter two periods were used when data were available.

Mean rank scores (N=3) over all time periods indicated that Herring Gull eggs from the two Lake Huron colonies (Double and Chantry Islands) and the colony in western Lake Erie (Middle Island) had the lowest overall mean ranks (lowest concentrations) for both major and minor contaminants. The Lake Ontario colonies (Snake and/or Mugg's Islands) and one of the colonies in Lake Superior (Agawa Rock) usually had the highest overall concentrations. Although Lake Superior colonies are not highly contaminated with major contaminants, the concentrations of minor contaminants at Agawa Rock are second to those in Lake Ontario colonies. Hence, the high ranking for the Lake Superior colony.

The Lake Michigan colony (Gull Island) consistently had the highest residue levels for DDE, dieldrin, HE and oxy-chlordane. The Lake Ontario colonies had the highest levels for mirex, HCB, PCBs, 1,2,3,4-tetrachlorobenzene, pentachlorobenzene, 1,2,3,5/

1,2,4,5- tetrachlorobenzene and beta-hexachlorocyclohexane.

Summary/Discussion

From 1974 until 1988, levels of DDE, mirex and HCB in Herring Gull eggs from the Canadian Great Lakes have decreased over 80%; levels of PCBs have decreased 69% while levels of dieldrin have declined 50%. Levels of 2378-TCDD, which have been monitored only since 1981, have decreased 73%. There has been a significant decline in the levels of DDE, HCB and PCBs in Herring Gull eggs from all nine colonies where data was sufficient for statistical analysis. Mirex and dieldrin have decreased significantly on seven of nine and six of nine colonies, respectively.

In general, contaminant levels in Herring Gull eggs decreased dramatically from the mid to late 1970's. There was a notable and still unexplained increase in many contaminant values in 1981-82. Since that time, the levels have stabilized or continued their decline but declines have not been as rapid in the 1980s as during the late 1970s.

DOUBLE-CRESTED CORMORANT (*Phalacorcorax auritus*)
Distribution, Abundance, and Population Trends

Since the first confirmed breeding record of this species in 1920 in Lake Superior, cormorants have spread eastward throughout the Great Lakes (Cadman et al., 1987). During the 1940s, the species was so common that controls were instituted because it was deemed a competitor with local commercial fisheries (Omand, 1947). From *ca*. 1946 to 1975, cormorant populations on the Great Lakes seriously declined due to the cumulative effects of first, the control program, and subsequently, DDT-induced eggshell thinning (Price and Weseloh, 1986). In the late 1970s, DDT levels had declined markedly in cormorant eggs. This species has made tremendous gains in numbers on the Great Lakes which has coincided with the decline in DDT levels. From 1981 to 1985, the Canadian Wildlife Service documented a 270% (3359 nests) increase in the number of cormorant nests on the Great Lakes (Cadman et al., 1987). In 1984, on the Canadian side of Lake Huron, Superior and all of Lakes Ontario and Erie, there were 3659 nests and in 1988, this total had increased to 11093 nests.

Table 13. Years and sites of collections of Double-crested Cormorant eggs.

Year	Collection Site
1970	Blackbill Island (Georgian Bay)
1971	Wallis Rock (Georgian Bay)
	Blackbill Island (Georgian Bay)
	Talon Rock (N.Channel/Lake Huron)
	Doucet Rock (N.Channel/Lake Huron)
1972	Big Chicken Island (Lake Erie)
	Wallis Rock (Georgian Bay)
	Gull Rock (N.Channel/Lake Huron)
	Talon Rock (N.Channel/Lake Huron)
	Bustard Rock (N.Channel/Lake Huron)
	Doucet Rock (N.Channel/Lake Huron)
	Scotch Bonnet Island (Lake Ontario)
1973	Wallis Rock (Georgian Bay)
	Africa Rock (N.Channel/Lake Huron)
1975	Gull Rock (N.Channel/Lake Huron)
	Africa Rock (N.Channel/Lake Huron)
	Doucet Rock (N.Channel/Lake Huron)
	Scotch Bonnet Island (Lake Ontario)
1979	Big Chicken Island (Lake Erie)
	Africa Rock (N.Channel/Lake Huron)
1981	Pigeon Island (Lake Ontario)
	Little Galloo Island (Lake Ontario)
	Big Chicken Island (Lake Erie)
1983	Big Chicken Island (Lake Erie)
	Gravel Island (Lake Superior)

Contaminant trends examined

Levels of organochlorine contaminants in Great Lakes cormorant eggs were first monitored in the late 1960s. At that time, eggs were heavily contaminated with DDE, PCBs and mercury, and various parameters of breeding success were low and declining (Vermeer and Peakall,1977a,b; Postupalsky,1978). The data analysis presented here and by Weseloh (unpublished) examine temporal and geographic variations in residue levels in Double-crested Cormorant eggs at colonies in the Canadian Great Lakes only during 1971-1981.

Temporal variation in contaminant concentrations

Significant increases and decreases occurred in concentrations of eight compounds (PCB 1260, DDE, mercury, dieldrin, DDD, DDT, hexachlorobenzene (HCB), heptaclor epoxide (HE)) measured in cormorant eggs in 1972, and again in 1979 for three colonies on Lake Huron (Africa, Doucet and Gull Rocks) and Big Chicken Island (Lake Erie). A significant decrease in DDE, and DDT levels occurred in Lake Huron colonies. Mercury decreased significantly in the Lake Erie colony, and increased, but not significantly, in Lake Huron. Levels of PCB 1260, HCB and heptachlor epoxide increased significantly in Lake Erie. Levels of PCB 1260 decreased and heptachlor epoxide increased at Lake Huron but these changes were not significant. Dieldrin levels decreased at Lake Huron, and increased at Lake Erie but not significantly in either case (Weseloh, unpublished).

Geographic variation in contaminant concentrations

Analysis of variance (ANOVA) and Student-Neuman Keul tests were applied to contaminant data (PCB 1260, DDE, DDT, heptachlor epoxide(HE), HCB, mirex) from colonies in 1971, 1972, 1979, and 1981.

In 1971, levels in eggs from Talon Rock (N.Channel/Lake Huron), Wallis Rock (Georgian Bay/Lake Huron), and Blackbill Islands (Georgian Bay/Lake Huron) were compared. The Wallis Rock colony had significantly higher levels of DDT and HCB than detected elsewhere. Levels of other contaminants did not vary significantly between sites.

Analysis of contaminant data from 1972, for sites described above, indicate that the range of DDE, DDT and heptachlor epoxide among colonies was significantly different overall but no single site had levels that differed significantly from any other. In each case, the lowest values were obtained from Big Chicken Island (Lake Erie) and the highest values occurred in colonies in the North Channnel and Georgian Bay.

All the major contaminants were detected in eggs collected in 1979, but levels were not significantly different among the colonies except for PCB and mirex levels. In Lake Erie eggs, PCB 1260 was detected in significantly higher concentrations than in eggs from Lake Huron colonies. However, mirex levels were significantly higher in Lake Huron eggs.

In 1981, levels of PCBs were significantly lower at Pigeon Island (Lake Ontario) than at all other colonies sampled. However, Little Galloo Island (Lake Ontario) had significantly higher mirex concentrations than those found at at Pigeon Island, which in turn, had higher levels than at Big Chicken Island (Lake Erie).

Summary/Discussion

The Double-crested Cormorant has experienced tremendous changes in population numbers in the past twenty years which are attributed to changes in DDT levels in their eggs. Trends in contaminants in this species generally coincide with that found in gulls and terns in the Great Lakes, but this species and the Black-crowned Night-Heron exhibited the most sensitivity to the effects of DDT. Although decreases in DDT levels have allowed the population to increase dramatically in recent years, deformities such as crossed bills, clubfeet, edema, and gastroschisis are occurring in higher numbers in cormorant populations in Green Bay, Lake Michigan and Saginaw Bay, Lake Huron (Gilberston et al., 1991) than in any of the Canadian cormorant colonies (Weseloh and Ross, unpublished). This is believed to be linked to contaminant exposure.

CASPIAN TERN (Sterna caspia)
Distribution, Abundance and Population Trends

Caspian Tern numbers have been increasing in the Canadian Great Lakes over the past twenty years. However, the distribution of the Caspian Tern is limited in Canada in that the species only occurs in Lakes Huron and Ontario. Colonies are also present in Lake Michigan.

In 1962, 610 pairs of Caspian Terns nested in the Canadian waters of Lakes Huron, and Superior, and 525 pairs nested in the American waters of Lakes Huron, Superior, and Michigan (Ludwig, 1962). A survey of the U.S. Great Lakes in 1976-77 found Caspian Tern colonies located only in Lake Michigan (Scharf et al.,1978). In 1976, 1046 nests were present in Lake Michigan. This number decreased slightly to 998 nests in 1977 for colonies that were active and undisturbed in both years.

In 1980, 2138 nests of Caspian Terns (Sterna caspia) were counted throughout eight colonies in Canadian Lake Huron (Weseloh et al., 1986). This reflects a probable increase of 50% in the population size during the previous decade. The increase was mainly due to the establishment of two new colonies in Lake Huron during that period.

In Lake Ontario, an increase from 44 nests to 708 occurred during 1976 to 1987 (Blokpoel and Scharf, 1991). Further growth of the Caspian Tern population is predicted during the next few years (Blokpoel and Scharf, 1991).

Table 14. Years and sites of collections of Caspian Tern eggs.

Year	Collection sites
1972	South Limestone Island (Lake Huron)
1980	South Limestone Island (Lake Huron) Half Moon Island (Lake Huron) Cousins Island (Lake Huron) Isle Aux Galets (Lake Michigan) Gravelly Island (Lake Michigan) Hat Island (Lake Michigan)
1981	Pigeon Island (Lake Ontario)

Contaminant trends examined

Struger and Weseloh (1985a) provide the first and only discussion of environmental contaminants in this species as they relate to reproductive success parameters from the Great Lakes. The following summary is a condensation of their analysis of spatial and temporal variation of DDE, mirex, hexachlorobenzene and PCB 1254:1260.

Temporal variation in contaminant concentrations

South Limestone Island (Georgian Bay) is the only site where Caspian Tern eggs were collected in more than a single year. Of the three contaminants detected in eggs in both 1972 and 1980 at South Limestone Island (DDE, HCB and PCB 1260), DDE and PCB 1260 showed significant declines and the third, HCB, which occurred in trace amounts, showed no change in concentration.

Geographic variation in contaminant concentrations

In 1980-1981, eggs were collected from three colonies on Lake Huron, three colonies on Lake Michigan, and one colony on Lake Ontario (Table 14).

In 1980, DDE levels were significantly higher at Gravelly Island (Lake Michigan) than at all other sites sampled. There were no significant inter-colony or inter-lake differences in DDE detected among the remaining six sites. Eggs from Pigeon Island (Lake Ontario), had significantly greater concentrations of mirex than in eggs from all other sites on the Great Lakes. Mirex levels were similar at colonies throughout Lake Michigan and Lake Huron with the exception of the significantly higher level at South Limestone Island (Lake Huron). Hexachlorobenzene concentrations were not significantly different among colonies throughout the Great Lakes. Concentrations of PCB 1254:1260 were highest at Pigeon Island but were only significantly higher than levels measured in eggs at one of six colonies, Half Moon Island (Lake Huron).

Summary/Discussion

Caspian Tern eggs from Lakes Ontario and Michigan eggs appear to be the most contaminated. The occurrence of the highest levels of PCBs in Lake Ontario eggs and highest levels of DDE in Lake Michigan eggs among all Great Lakes sampled coincides with geographic variation found in contamination in Herring Gull eggs. Limited sample sites and years of sampling preclude discussion of detailed trends in contamination in Caspian Tern eggs.

COMMON TERN (*Sterno hirundo*)
Distribution, Abundance, and Population Trends

Common Terns nest on all five Great Lakes. At least 58 Common Tern colonies containing 50 or more nests existed during 1900-1980 or were still active in 1980 in the Lower Great Lakes. The estimated numbers of nests were 4000-7000 during 1900-1920 and the numbers peaked at 16000 pairs in the early 1960s. The numbers declined to 5000 pairs in the late 1970s (Courtney and Blokpoel, 1980; 1983). In a comparison of populations of seven species of colonial waterbirds in 1960-62 relative to those in 1980, the Common Tern was the only species whose numbers had declined. Of twenty four colonies for which historical data were available (33.8% of colonies existing in 1980), the population had been reduced by a minimum of 42% from 1960-1962 with an average decline of 3.8% annually. In 1980, 10775 Common Tern nests existed on the Canadian and U.S. Great Lakes (Weseloh et al., 1986). In Lake Ontario, 943 Common Tern nests remained in 1987 in comparison to 1299 nests in 1976. This represents a 2.7% annual decrease in nests during that period (Blokpoel and Scharf, 1991).

In the U.S. Great Lakes, populations of Common Terns declined from 2135 nests in 1976 to 1772 in 1977 (Scharf et al., 1978). In 1980, Common Tern populations on Lake Michigan increased to 1496 pairs from 794 pairs in 1977. This was a result of increased use of man-made nesting sites in 1980 (Shugart and Scharf, 1983).

Reductions in Common Tern populations, especially in the Lower Great Lakes, are of concern. These decreases have been attributed to their sensitivity to predation by birds and mammals, disturbance by humans and their pets, invasion of natural nesting areas by Ring-billed Gulls, and pollution of the aquatic environment (Courtney and Blokpoel, 1980;1983; Blokpoel and Scharf, 1991). At this time, pollution is believed to be one of the less significant factors among those that contribute to decreases in Common Tern populations.

Table 15. Years and sites of collection of Common Tern eggs.

Year	Collection site
1971	Hamilton Harbour (Lake Ontario)
1972	Mugg's Island (Lake Ontario) Port Colborne Lighthouse (Lake Erie) Fighting Island (Detroit River) Kettle Point (Lake Huron)
1973	Port Colborne Lighthouse (Lake Erie) Port Colborne Canada Furnace (Lake Erie) Toronto Islands (Lake Ontario)
1975	Gull Island (Lake Ontario)
1979	Fighting Island (Detroit River)
1981	Leslie St. Spit (Lake Ontario) Port Colborne Lighthouse (Lake Erie) Fighting Island (Detroit River) North Limestone Island (Lake Huron)

Contaminant trends examined

The following comparisons of contaminant levels on a temporal basis have been made between the two years for which collections were most extensive, 1972 and 1981. The only year for which geographic comparisons have been made is 1981 (Weseloh et al., 1989).

Temporal variation in contaminant concentrations

Comparisons of DDE and PCB data in 1981 with earlier studies in 1972 indicate decreases of 73.8-87.3% in DDE and PCB 1260 concentrations. At Mugg's Island (Lake Ontario) in 1972 compared to Leslie St. Spit (Lake Ontario) in 1981, DDE and PCB 1260 decreased 80.7% and 84.0% respectively. Similar decreases were evident at Port Colborne (Lake Erie), DDE decreased 82.4% and PCB 1260 decreased 87.3% between 1972 and 1981. At Fighting Island, PCB 1260 decreased 73.8% between 1981 and 1972 (calculated from Weseloh et al., 1989). DDE was not measured in eggs from Fighting Island in 1972.

Geographic variation in contaminant concentration

In 1981, eggs from Leslie St. Spit (Lake Ontario) were more contaminated with DDE, PCB 1254:1260, HCB, dieldrin, and mirex than eggs from Fighting Island (Detroit River), Port Colborne Lighthouse (Lake Erie), and North Limestone Island (Lake Huron). However, DDE, dieldrin and t-nonachlor concentrations in eggs from Leslie St. Spit were not significantly different than those in eggs from North Limestone Island. DDE levels at Fighting Island and Port Colborne were significantly lower than in eggs from Leslie St. Spit and North Limestone Island. PCB concentrations were significantly higher at Leslie St. Spit and Fighting Island than in Port Colborne eggs and concentrations in eggs from these three sites were significantly higher than in eggs from North Limestone Island. Levels of mirex were significantly greater in eggs from Leslie St. Spit. Concentrations of mirex, dieldrin and t-nonachlor in eggs from Port Colborne and Fighting Island were not detectable in more than half the eggs analyzed therefore these data were not included in the statistical analysis.

Eggs from at least one of these colonies also contained detectable levels of oxy-chlordane, cis-chlordane, and toxaphene however less than half of the samples from more than three colonies did not have detectable levels. Therefore statistical analysis was not performed on data for these compounds (Weseloh et al., 1989).

Summary/Discussion

Common Tern eggs have contained lower organochlorine concentrations than neighbouring species, such as Herring Gulls and Caspian Terns (Weseloh et al., 1989).

BLACK-CROWNED NIGHT-HERON (Nycticorax nycticorax)
Distribution, Abundance, and Population Trends

From the 1900s until the late 1960s, Black-crowned Night-Herons established nesting colonies throughout the lower Great Lakes. In 1936, well-established colonies were known only in south-western Ontario with a few nesting pairs in Hamilton and Toronto (Baillie and Harrington, 1936) By the 1950s, this species was widespread along the Lower Great Lakes (Baillie, 1951). In the 1970s, the size of the Great Lakes population quickly decreased due to eggshell thinning caused by DDT. The Pigeon Island (Lake Ontario) heronry had 78 nests in 1968 but declined to 15 nests in 1973 (Quilliam, 1973) and has since disappeared. Although Black-crowned Night-Heron populations have not been as well documented as other species on the Great Lakes, this decline appeared to occur in all other Great Lakes colonies (Cadman et al., 1987).

The population decline in the Great Lakes was followed by a period of recovery during the 1980s (Cadman et al.,1987). The estimated total number of nests in Ontario was 8430 in the early 1980s (Peck and James,1983), the majority of which occurred on the lower Great Lakes (Cadman et al., 1987). Black-crowned Night-Herons appear to be increasing again in their distribution and abundance in the Great Lakes (Burgess et al., unpublished).

Table 16. Years and sites of collections of Black-crowned Night-Heron eggs.

Year	Collection Site
1972	Pigeon Island (Lake Ontario)
1982	Pigeon Island (Lake Ontario) Little Galloo Island (Lake Ontario) Niagara River Middle Island (Lake Erie) Chantry Island(Lake Huron)
1986	Niagara River Middle Island (Lake Erie) Walpole Island (Lake St.Clair)

Contaminant trends examined

Temporal changes in contaminant levels in eggs from Pigeon Island (Lake Ontario) in 1972 to 1986, and Middle Island(Lake Erie) and the Niagara River in 1982 to 1986 were examined.

The only report discussing geographic variation in contaminant levels in eggs of Black-crowned Night-Herons from the Great Lakes concerns five heronries sampled in 1982 (Weseloh et al., 1986). Only data from 1982 have been analyzed since only one colony/year had been sampled in other years, except in 1986, and in that year statistical analysis was deemed inappropriate because there was only a single egg collected from each heronry.

Temporal variation in contaminant concentrations

In 1972, seven organochlorine residues as well as mercury were detected in Night-Heron eggs. By 1986, mercury was not detectable however a total of 19 organochlorine chemicals were found in eggs in all three heronries sampled. Thus, while mercury dropped to non-detectable levels between 1972 and 1982, there was a increase in the array of detectable contaminants. Among the chemicals found in eggs in both 1972 and 1982 at Pigeon Island, DDE, PCB 1260 and hexachlorobenzene had all declined between the two sample years by greater than 50%. However, by 1982, dieldrin showed no change, and DDT and heptachlor epoxide had increased by greater than 500% as compared to 1972.

In Lake Erie at Middle Island, 11 of 13 compounds (a-and o-chlordane, HCB, DDE, DDD, DDT, dieldrin, heptachlor epoxide, b-hexachlorocyclohexane, mirex, t-nonachlor, PCB 1260, and PCB 1254:1260) decreased in concentration between 1982 and 1986, some as much as 88%, and 2 of the 13 compounds showed no change in concentration. At the Niagara River and between the same years, only 6 of 13 chemicals decreased, 2 chemicals increased in concentration, and 5 did not show any substantial change. The chemicals t-nonachlor and PCB 1254:1260 increased 268.5% and 76.5% respectively.

Geographic variation in contaminant concentrations

Eggs from Pigeon and Middle islands were analyzed individually while eggs from Niagara River, Little Galloo Island and Chantry Island were analyzed as pooled samples. Therefore statistical analysis is limited to comparisons between Pigeon and Middle Islands.

DDE and mirex levels were significantly higher at Pigeon Island than at Middle Island. Residue levels for all other compounds measured (dieldrin, heptachlor epoxide, o-chlordane, a-hexachlorocyclohexane, b-hexachlorocyclohexane, 1234-tetrachlorobenzene, 1235/1245-tetrachlorobenzene, penta-chlorobenzene, hexachlorobenzene, and PCB 1254:1260) were not significantly different between the two colonies.

The Niagara River and/or Pigeon Island had the highest levels of all contaminants compared to all other colonies. Following these two sites, Little Galloo Island, Chantry Island, and Middle Island were ranked most to least contaminated.

Summary/Discussion

Most contaminant levels in Black-crowned Night-Heron eggs have been reduced greatly in Lake Ontario since the early seventies although decreases in the eighties have not been pronounced. There have also been some notable increases in certain compounds at both the Pigeon Island and Niagara River colonies.

As with the Herring Gull data, contaminant levels in Night-Heron eggs in Lake Ontario are higher than those in Lake Erie and Lake Huron.

RING-BILLED GULL (*Larus delawarensis*)
Distribution, Abundance, and Population Trends

The population of the Ring-billed Gulls on the Great Lakes were fairly stable from 1940 to 1960 and was estimated at 27 000 pairs (Ludwig, 1974). By 1967, populations had increased five-fold to 141 000 pairs and the species had extended its breeding range from Lake Ontario and Huron to Lake Michigan (Blokpoel and Tessier, 1986). Nesting populations had increased to 281 000 by 1976 on the entire Great Lakes. In 1984, the estimated population had more than doubled again to 648 000 pairs. This represents an average annual increase of 11% from 1976-1984 (Blokpoel and Tessier, 1986). Nest counts since 1984 in the Great Lakes have not indicated any signs of population decline for this species and it is now considered by some as a problem species in the Great Lakes.

Table 17. Years and sites of collections of Ring-billed Gull eggs.

Year	Collection Site
1979	Mugg's Island (Lake Ontario) Fighting Island (Detroit River)
1984	Hamilton Harbour (Lake Ontario) Fighting Island (Detroit River)

Contaminant trends examined

Student t-tests were applied to contaminant concentrations to assess differences in the levels among sites in Lake Ontario and the Detroit River in 1979 and 1984.

Temporal variation in contaminant concentrations

Concentrations of all but three compounds measured in both 1984 and 1979 were higher in 1979 at Fighting Island (Detroit River). Compounds measured in both years were DDE, DDT, dieldrin, heptachlor epoxide (HE), PCB 1260, PCB 1254:1260, DDD, mirex, hexachlorobenzene (HCB), a-chlordane, o-chlordane, and b-hexachlorocyclohexane. Levels of HCB, a-chlordane, b-hexachlorocyclohexane were significantly higher in 1979 and levels of o-chlordane, and mirex were significantly higher in 1984. Concentration of HE was higher in 1984 but not significantly different than 1979 levels.

Levels of all chemicals measured in 1979 at Mugg's Island (Lake Ontario) and 1984 at Hamilton Harbour (Lake Ontario) were highest at Mugg's Island except DDE, DDT and o-chlordane. Compounds measured at these sites in both years include all compounds measured at Fighting Island (above) except a-chlordane.

Geographic variation in contaminant concentrations

Concentrations of HE, mirex, photo-mirex, o-chlordane, b-hexachlorocyclohexane, DDD, DDE, DDT, dieldrin, PCB 1260, mirex, PCB 1254:1260, and a-chlordane were measured at Fighting Island and Mugg's Island in 1979. Mugg's Island had higher levels of all compounds than Fighting Island except DDT. Levels of HE, mirex, photo-mirex, o-chlordane, b-hexachlorocyclohexane were significantly higher at Mugg's Island as compared to levels at Fighting Island.

In 1984, Hamilton Harbour had higher concentrations of twelve of eighteen chemicals compared to Fighting Island. The chemicals measured at both sites in 1984 include all of those measured at Mugg's and Fighting Islands in 1979, as well as g-chlordane, 1234-chlorobenzene, pentachlorobenzene, t-nonachlor, a-hexachlorocyclohexane, and 1235/1234-chlorobenzene. Levels of DDD, DDE, PCB 1260, HCB, mirex, a- and g-chlordane, and t-nonachlor were significantly higher at Hamilton compared to Fighting Island. Levels of 1234-chlorobenzene, pentachlorobenzene, 1235/1234-chlorobenzene, a-hexachlorocyclohexane were significantly higher at Fighting Island and b-hexachlorocyclohexane concentrations were about equal at Hamilton Harbour and Fighting Island.

Summary/Discussion

Contaminant levels in Ring-billed Gull eggs have decreased substantially in most cases since their first analysis in 1979. Lake Ontario eggs, in particular, those from Hamilton Harbour, are clearly the most contaminated among the limited number of sites sampled.

Contaminant levels are not measured regularly in this species due to Ring-billed Gulls' migratory habits and more omnivorous diet (Section 4, Table 19, Page 4-13) than the Herring Gull. Hence, among the gull species of the Great Lakes it is more relevant to use Herring Gull eggs as indicators of contamination in forage fish of the Great Lakes.

FORSTER'S TERN (Sterna forsteri)
Distribution, Abundance, and Population Trends

The Forster's Tern is endemic to North America, breeding primarily in prairie regions (Godfrey, 1986). There is a small breeding population in the Canadian Great Lakes located at two main areas, Walpole Island (St.Clair River) and Long Point (Lake Erie), with smaller colonies at Kettle Point (Lake Huron), Point Pelee and Rondeau Harbour (Lake Erie) (Cadman et al., 1987). Since 1976, this species has been documented at three locations in Ontario comprised of six colonies and average colony size was six nests (Peck and James, 1983). At Walpole Island, four sub-colonies containing a minimum of 27 nests were found in 1988 (McNicholl, 1988).

Table 18. Years and sites of collections of Forster's Tern eggs.

Year	Collection Site
1986	Long Point (Lake Erie) Walpole Island (St.Clair River)

Contaminant trends examined

The sample size for this species is comprised of one egg from each of the two sites and therefore were not suitable for statistical analysis. These results should be regarded as baseline records from which future measures of contaminant levels can be compared.

Geographic variation in contaminant concentrations

Contaminant levels at the two sites were similar. The levels of PCB's at the Walpole Island site were marginally greater than Long Point eggs. Most contaminants at both colonies were found in low or trace amounts. A total of 15 residues (i.e. 50% of those measured) were detected.

Section 4.
Diets of Selected Colonial Fish-eating Birds of the Great Lakes

Index to Diets of Selected Colonial Fish-eating Birds of the Great Lakes

Page

Herring Gull.. 4-6

Double-crested Cormorant............................ 4-9

Caspian Tern.. 4-10

Common Tern... 4-11

Black-crowned Night-Heron........................... 4-12

Ring-billed Gull.................................... 4-13

Forster's Tern...................................... 4-14

Abbreviations specific to Table 19.

a = abundant (food item had frequency of occurrence >50% within the total sample)

c = common (food item had frequency of occurrence between 10 and 50% within the total sample)

u = uncommon (food item had frequency of occurrence between 0.1 and 9% within the total sample)

x = food item was present in the sample but percent frequency of occurrence was not reported.

xx = sample type used in study

The lack of a letter or number accompanying the food item indicates that the food item was NOT found in the sample.

LIST OF SCIENTIFIC NAMES SPECIFIC TO TABLE 19

Common fish names are listed in the alphabetical order (see name in **bold**) and all others are listed afterward in the order in which they appear on Table 19.

alewife	*Alosa pseudoharengus*
rock **bass**	*Ambloplites rupestris*
smallmouth **bass**	*Micropterus dolomieui*
bullhead	*Ictalurus nebulosus*
burbot	*Lota lota*
catfish sp.	*Ictalurus sp.*
lake northern **chub**	*Cousesius plumbeus*
johnny **darter**	*Etheostoma nigrum*
drum sp.	*Aplodinotus sp.*
freshwater **drum**	*Aplodinotus grunniens*
herring	*Coregonus sp.*
bluntnose **minnow**	*Pimephales notatus*
fathead **minnow**	*Pimephales promelas*
minnow sp.	*Notropis sp.*
trout **perch**	*Percopsis omiscomaycus*
yellow **perch**	*Perca flavescens*
northern **pike**	*Esox lucius*
pumpkinseed	*Lepomis gibbosus*
sculpin sp.	*Cottus sp.*
slimy **sculpin**	*Cottus cognatus*
spoonhead **sculpin**	*Cottus ricei*
emerald **shiner**	*Notropis atherinoides*
golden **shiner**	*Notemigonus crysoleucas*
spottail **shiner**	*Notropis hudsonius*
common **shiner**	*Notropis cornutus*
smelt	*Osmerus mordax*
ninespine **stickleback**	*Pungitius pungitius*
sucker sp.	*Catostomus sp.*
longnose **sucker**	*Catostomus catostomus*
lake **trout**	*Salvelinus namaycush*
common **whitefish**	*Coregonus clupeaformis*

frog	Rana pipiens
true bugs	Hemiptera
beetles	Coleoptera
butterflies	Lepidoptera
flies	Diptera
wasps, bees, ants	Hymenoptera
mayflies	Ephemeroptera
cicadas, leafhoppers, scale insects	Homoptera
spongilla flies	Neuroptera
peamouth	Mylocheilus caurinus
dragonflies	Odonata
caddisflies	Trichoptera
grasshoppers	Orthoptera

Table 19. Diets of selected fish-eating birds of the Great Lakes.

HERRING GULL

Study Site	Gull Island, L.Ontario	Scotch Bonnet Island, L.Ontario	Snake Island, L.Ontario	West Brother Island, L.Ontario
Study date	April-June 1977	April-June 1977	April-June 1977	April-June 1977
	Percent Frequency of Occurrence in total sample			
Food Item				
Total Fish	57.5	68	41.2	63.6
Total Mammal	15.5		48.1	
Total Bird	9.2	16.9	0.8	
Total Insect	36.8	36.1		56.7
Crustacean, Earthworm, and Plant material	7.5	15.2	7.8	6.0
Sample type -food pellets	xx	xx	xx	xx
Sample size (N)	174	722	524	187
Sample type -food pellets	xx	xx	xx	xx
Reference	Fox et al., 1990	Fox et al., 1990	Fox et al., 1990	Fox et al., 1990

HERRING GULL

Study Site	Lake Erie	Fighting Island, Detroit R.	Lake Huron	Georgian Bay
Study date	1979-81	Mar.-April 1978-81	Mar.-April 1980-81	Mar.-April 1980-81
	Percent Frequency of Occurrence in total sample			
Food Item				
Total Fish	76	73	5	5
Total Mammal	5		78	25
Total Bird	1	2	10	13
Total Invertebrate	1	5	2	4
Total Plant	16		1	4
Total Garbage		19	3	47
Sample type -food pellets	xx	xx	xx	xx
Sample Size (N)	231	85	167	135
Reference	Ewins, et al., (in press)	Ewins, et al., (in press)	Ewins, et al., (in press)	Ewins, et al., (in press)

HERRING GULL

Study Site	Hamilton Harbour, L.Ontario	Little Galloo Island, L.Ontario	Scotch Bonnet Island, L.Ontario	Niagara River,
Study date	1982,1990-91	1982,1990-91	1982,1990-91	1982-83
	Percent Frequency of Occurrence in total sample			
Food Item				
Total Fish	60	94	98	50
Total Mammal	23	9	4	1
Total Bird	26	7	18	16
Total Invertebrate	7	3	5	30
Total Plant	57	38	21	15
Total Garbage	62	7	7	45
Sample type -food pellets	xx	xx	xx	xx
Sample size (N)	121	152	224	151
Reference	Ewins, et al., (in press)	Ewins, et al., (in press)	Ewins, et al., (in press)	Ewins, et al., (in press)

DOUBLE-CRESTED CORMORANT

Study Site	Gull Island, Lake Superior	Eagle Island, Lake Superior
Study year	1984	1984
	Percent Frequency of Occurrence in Total Sample	
Food Item		
Total Fish	99.6	99.1
-alewife		
-smelt	u	u
-yellow perch		
-ninespine stickleback	c	
-burbot	c	c
-slimy sculpin	c	c
-lake northern chub	c	u
-spoonhead sculpin	c	u
-sculpin sp.		
-trout perch	u	
-longnose sucker	u	u
-lake trout	u	u
-Menominee whitefish	u	u
-common whitefish	u	u
-herring	u	u
-sucker sp.		
Total Invertebrate	0.4	0.9
Sample type		
-food pellets	xx	xx
-regurgitations	xx	xx
Sample size (N)	150	150
Reference	Craven and Lev, 1987	Craven and Lev, 1987

CASPIAN TERN

Study Site	Pigeon Island, L.Ontario	South Limestone Island, Georgian Bay	Little George Island, Lake Winnipeg
Study date	1977	1980	1971
	Percent Frequency of Occurrence in total sample		
Food Item			
Total Fish	100	100	100
-alewife	a	x	
-smelt	u	x	
-yellow perch	c	x	
-smallmouth bass	u	x	
-golden shiner	u		
-pumpkinseed	u	x	
-rock bass	u	x	
-northern pike		x	
-ninespine stickleback		x	
-emerald shiner		x	
Total Bird			0.3
Total Insect			6.0
Eggshell			3.2
Sample type			
-food pellets	xx		xx
-adult to chick feeding observations		xx	
Sample size (N)	46		784
Reference	Allan, 1977	Quinn, 1980	Vermeer, 1973

COMMON TERN

Study Site	Little George Island, Lake Winnipeg	Leslie St. Spit, L.Ontario	Tower Island, Niagara R.
Study date	1971	1979	1979
	Percent Frequency of Occurrence in total sample		
Food Item			
Total Fish	35.4 *	100	100
-alewife		a	
-smelt		c	a
-trout perch			u
-emerald shiner		u	a
-spottail shiner		u	u
-common shiner			
-bluntnose minnow			c
-fathead minnow		u	
Total Insect	92.3		
Sample type			
-food pellets	xx		
-birds observed carrying food		xx	xx
-found on colony grounds		xx	xx
Sample size (N)	316	888	257
Reference	Vermeer, 1973	Courtney and Blokpoel, 1980	Courtney and Blokpoel, 1980

* = fish species occurring in sample were not identified.

BLACK-CROWNED NIGHT HERON

Study Site	Tommy Thompson Pk. L.Ontario	West Sister Island,L.Erie
Study date	1988	1972
	Percent Frequency of Occurrence in total sample	
Food Item		
Total Fish	88.2	100
-alewife	c	
-smelt		
-goldfish	u	
-white perch	u	
-pumpkinseed	u	
-johnny darter	u	
-minnow sp.		c
-catfish sp.		u
-herring sp.		c
-perch sp.		c
-drum sp.		
Total Mammal	3.9	
Total Bird	19.1	
Total Amphibia	0.6	
-frog	u	
Total Crustacea	7.9	
-crayfish	u	
Total Mollusc	0.9	
-snail	u	
Total Insect	17.6	36.8
Sample type		
-food pellets	xx	
-regurgitations	xx	
-gizzard contents	xx	
-stomach contents		xx
Sample size (N)	330	19
Reference	Burgess et al. (unpublished)	Hoffman, 1978

RING-BILLED GULL

Study Site	Gull Island, L.Ontario	Compilation of data from three study sites: Isle aux Galets, Bird Island, and Rogers City, Lake Michigan
Study date	April 1977	1971
	Percent Frequency of Occurrence in total sample	
Food Item		
Total Fish	55	62.2
-alewife	a	x
-smelt	c	
-yellow perch	u	x
-pumpkinseed	u	
-rock bass	u	x
-stickleback		x
-minnow sp.		x
Total Bird	10	
Total Amphibia	20	
Total Crustacea	20	1.2
Total Mollusca	20	
Total Annelida		5.2
Total Insect	10	64
-true bugs	u	
-cicadas, leafhoppers scale insects	u	c
-beetles	u	
-caddisflies	u	u
-butterflies	u	c
-flies	u	c
-wasps, bees, ants	u	c
-mayflies	u	u
-dragonflies		u
-grasshoppers		u
-spongilla flies		u
Total Plant	20	
Sample type		
-food pellets	xx	
-regurgitations		xx
Sample size (N)	38	232
Reference	Allan, 1977	Jarvis and Southern, 1976

FORSTER'S TERN

Study Site	Delta, Manitoba Pk., Lake Manitoba
Study date	1971

Food Item	Percent Frequency of Occurrence in total sample
Total Fish	a
-pumpkinseed	x
-peamouth	x
-fathead minnow	x
Total Amphibia	x
-frog	x
Total Crustacea	x
-crayfish	x
Total Insect	x
-dragonflies	x
-caddisflies	x
-grasshoppers	x

Sample type
-summary of food items in diet from published reports

Sample size (N)	-
Reference	McNicholl, 1971

REFERENCES

Allan, L.J. 1977. The comparative feeding ecology relative to population dynamics of the Herring and Ring-billed Gull (Larus argentatus and Larus delawarensis) and some comparisons with the Caspian Tern. M.Sc. Queens University, Kingston, Ontario.

Baillie, J.L., Jr. 1951. Fall migration. Ontario-western New York region. Audubon Field Notes, 5:12-14.

Baillie, J.L.,Jr. and Harrington, P. 1936. The distribution of breeding birds in Ontario, part 1. Trans. R. Can. Inst. 21: 1-50.

Blokpoel, H., and Tessier, G.1986. The Ring-billed Gull in Ontario: a review of a new problem species. Can. Wildl. Serv. Occas. Pap. 57. 34pp.

Blokpoel, H. and Scharf, W.C. 1991. Status and conservation of seabirds nesting in the Great Lakes of North America. ICBP Tech. Publ. No.11: 17-41.

Blokpoel, H., and Tessier, G. 1991. Distribution and abundance of colonial waterbirds nesting in the Canadian portions of the lower Great Lakes system in 1990. Can. Wildl. Serv. tech. rep. No.117. 16pp.

Burgess, N.M., Blokpoel, H. and Tessier, G.D. 1989. Reproductive success and food habits of Black-crowned Night-Herons in Tommy Thompson Park, Toronto, Ontario. Can. Wildl. Serv., unpublished report, 74pp.

Cadman, M.J., Eagles, P.F.J., Helleiner, F.M. 1987. Atlas of the Breeding Birds of Ontario. University of Waterloo Press. 617pp.

Courtney, P.A. and Blokpoel, H. 1980. Food and indicators of food availability for common terns on the lower Great Lakes. Can. J.Zool. 58: 1318-1323.

Courtney, P. A. and Blokpoel, H. 1983. Distribution and numbers of Common Terns on the lower Great Lakes during 1900-1980: a review. Colon. Waterbirds 6: 107-120.

Craven, S.R. and Lev, E. 1987. Double-crested Cormorants in the Apostle Islands, Wisconsin, USA: population trends, food habits, and fishery depredations. Colon. Waterbirds 10 (1): 64-71.

Ewins, P.J., Weseloh, D.V., Groom, J.H., Dobos, R.Z., Mineau, P. 1993. The diet of Herring Gulls (Larus argentatus) during winter and early spring on the lower Great Lakes. Hydrobiologica, in press.

Fox, G.A., Allan, L.J., Weseloh, D.V., Mineau, P. 1990. The diet of Herring Gulls during the nesting period in Canadian waters of the Great Lakes. Can. J. Zool. 68:1075-1085.

Gilbertson, M. 1975. A Great Lakes tragedy. Nat. Can. 4(1): 22-25.

Gilbertson, M.A., Kubiak, T., Ludwig, J.P., Fox, G.A. 1991. Great Lakes embryo mortality, edema, and deformities syndrome (GLEMEDS) in colonial fish-eating birds: similarity to chick-edema disease. J.Toxicol. Environ. Health 33:455-520.

Gilman, A.P., Fox, G.A., Peakall, D.B., Teeple, S.M., Carrol, T.R. 1977. Reproductive parameters and egg contaminant levels in Great Lakes Herring Gulls. J.Wildl. Manage. 41:458-468.

Godfrey, W.E. 1986. The birds of Canada, rev.ed. Natl. Mus. Can., Ottawa, 595pp.

Hoffman, R.D. 1978. The diets of herons and egrets in southwestern Lake Erie In: Wading birds. ed. Sprunt, A., Ogden, J.C. and Winckler, S. Natl. Audobon Soc. Res. Rep. 7: 365-369.

International Joint Commission, 1987. Report on Great Lakes water quality. Windsor, Ontario.

Jarvis, W.L. and Southern, W.E. 1976. Food habits of Ring-billed Gull breeding in the Great Lakes region. Wilson Bull. 88: 621-631.

Ludwig, J.P. 1962. A survey of the gull and tern populations of Lakes Huron, Michigan and Superior. Jack-Pine Warbler 40 (4):104-120.

Ludwig, J.P. 1974. Recent changes in the Ring-billed Gull population and biology of the Laurentian Great Lakes. Auk 91: 575-594.

McNicholl, M.K. 1971. The breeding biology and ecology of Forster's Tern, Sterna forsteri, at Delta, Manitoba. M.S.thesis, Univ. Winnipeg, Manitoba. 652pp.

McNicholl, M.K. 1988. Reconnaisance of Walpole Island, Ontario Forster's Tern colonies. Canadian Wildlife Service, unpublished report, 7pp.

Mineau, P. Fox, G.A., Norstorm, R.J., Weseloh, D.V., Hallett, D.J., Ellenton, J.A. 1984. Using the Herring Gull to monitor levels and effects of organochlorine contamination in the Canadian Great Lakes In: Toxic contaminants in the Great Lakes ed. J.O. Nriagu and M.S. Simmons. John Wiley and Sons, Inc., New York, pp.426-452.

Norstrom, R.J., Simon, M. and Mulvihill,M.J. 1986. A Gel-permeation/column chromatography method for the determination of CDDs in animal tissue. Intern. J. Environ. Anal. Chem. 23: 267-287.

Ontario Research Foundation, 1977. Trace metal analysis of biological tissues. Rep. No. 77-1. 5pp.

Ontario Research Foundation, 1979. Trace metal analysis of muskrat tissues. Rep. No. 79-9. 4pp.

Omand, D.N. 1947. The Cormorant in Ontario. Sylva 3(1): 19-23.

Peakall D.B., Norstrom R.J., Rahimtula A.D., Butler R.D. 1986. Characterization of mixed function oxidase systems of the nestling Herring Gull and its implications of bioeffects monitoring. Environ. Toxicol. Chem. 5: 379-385.

Peck, G.K. and James, R.D. 1983. Breeding birds of Ontario: nidiology and distribution, Vol.1: non-passerines. Life Sci. Misc. Publ., R. Ont. Mus., Toronto. 321 pp.

Postupalsky, S. 1978. Toxic chemicals and cormorant populations in the Great Lakes. Can. Wild. Serv., Wildl. Toxicol. Div. Ms. Rep. No. 20. Ottawa. 70 pp.

Price, I.M. and Weseloh, D.V. 1986. Increased numbers and productivity of Double-crested Cormorants, Phalacrocorax auritus, on Lake Ontario. Can. Field-Nat. 100(4): 474-482.

Quilliam, H.R. 1973. History of the birds of Kington, Ontario. 2nd rev. ed. Kingston Field Naturalists, Kingston. 209pp.

Quinn, J.S. 1980. Feeding rates, parental investment, and brood reduction in Caspian Terns, Sterna caspia. M.Sc. Thesis, Brock University, St.Catharine's, Ontario.

Ross, P.S. and Weseloh, D.V.1988. A study of the development, occurrence and severity of deformities in double-crested cormorants on the Canadian Great Lakes and Lake Winnipegosis, 1988. Can. Wildl. Serv., unpublished report.

Reynolds L.M. and Cooper T. 1975, Analysis of organochlorine residues in fish. Water Quality Parameters, Am. Soc. of Test. Mater. Special Technical Publication 573. 196-205.

Scharf, W.C., Shugart, G.W. and Chamberlin, M.L. 1978. Colonial birds nesting on man-made and natural sites in the U.S. Great Lakes. Waterways experiment station technical report D-78-10 U.S. Fish Wildl. Serv. rep. FWS/OBS-78/15.

Schugart, G.W. and Scharf, W.C. 1983. Common Terns in the Northern Great Lakes: current status and population trends. J.Field. Ornithol. 54 (2): 160-169.

Struger, J. and Weseloh, D.V. 1985a. Great Lakes Caspian Terns: Egg contaminants and biological implications. Colon. Waterbirds 8 (2): 142-148.

Struger, J., Elliott, J.E., Weseloh, D.V. 1987. Metals and essential elements in the Herring Gull from the Great Lakes, 1983. J.Great Lakes Res. 13(1):43-55.

Turle R., Norstrom R.J., and Won H.T., 1988. Quality assurance as applied to long-term monitoring of chemical residues and specimen banking In: Progress in environmental specimen banking, eds. S.A.Wise, R.Zeisler and G.M.Goldstein. Natl. Bur. Stand. (U.S.), Spec. Publ.740. pp.171-183 (Apr. 1988).

Turle R., Norstrom R.J. and Collins, B. 1991. Comparison of PCB quantitation methods: Re-analysis of archived specimens of Herring Gulls from the Great Lakes. Chemosphere 22(1-2): 201-213.

Vermeer, K. 1973. Comparison of food habits and mercury residues of Caspian Terns and Common Terns. Can. Field-Nat. 87:305.

Vermeer, K. and Peakall, D.B. 1977a. Environmental contaminants and the future of fish-eating birds in Canada In: Canada's threatened species and habitats ed. Mosquin, T. and Sudal, C. Can. Nat. Fed. Spec. Publ. 6: 88-95.

Vermeer, K. and Peakall, D.B. 1977b. Toxic chemicals in Canadian fish-eating birds. Mar. Pollut. Bull. 8:205-210.

Weseloh, D.V., Mineau, P., and Hallett, D.J.1979. Organochlorine contaminants and trends in reproduction in Great Lakes Herring Gulls, 1974-1978. Trans. 44th North Am. and Nat. Res. Conf., Wildl. Manage. Inst., Washington D.C. 543-557.

Weseloh, D.V., Mineau, P., Teeple, S.M., Bolkpoel, H., Ratcliff, B. 1986. Colonial waterbirds nesting in Canadian Lake Huron in 1980. Can. Wildl. Serv. Progr. Notes 165. 28pp.

Weseloh, D.V., Teeple, S.M. and Blokpoel, H. 1988a. The distribution and status of colonial waterbirds nesting in Western Lake Erie In: The biogeography of the island region of Western Lake Erie ed. J. F.Downhower. Ohio State University Press, U.S.A.

Weseloh, D.V., Teeple, S.M., and Braune, B.M. 1988b. Contaminant levels and eggshell thickness in Black-crowned Night-Herons from the Canadian Great Lakes, 1982. Can. Wildl.Serv., unpubl. rep., 30pp.

Weseloh, D.V., Custer, T.W. and Braune B.M. 1989. Organochlorine contaminants in eggs of Common Terns from the Canadian Great Lakes, 1981. Environ. Pollut. 59: 141-160.

Weseloh, D.V., Mineau, P., Teeple, S.M., McKeating, G.B., Postupalsky, S. 1982. Double-crested cormorant of the Great Lakes II. Improvement in quality of life parameters, 1972-73 vs. 1979-81. Can. Wildl. Serv. unpubl. rep. 21pp.

Weseloh, D.V., Mineau, P., J.Struger, S.M.Teeple, D.J.Hallett, R.J.Norstrom, A.P.Gilman, L.M.Reynolds, and B.M.Braune. 1992. A twelve year monitoring study of organochlorine contaminant levels in Herring Gull eggs from the Great Lakes, 1974-1985. Can. Wildl. Serv. unpubl. rep. 24pp.